OPERATOR'S MANUAL

SIMRAD
CX34/44/54

NavStation

183-3451-102 06354.20 English

Important information and warnings!

To activate the MOB 'MAN OVERBOARD' function, press and hold the [MOB] key for 2 seconds (further information on page III).

Insert or remove C-MAP cartridges ONLY through SETUP menu or when unit is off. Do not use MAX and NT+ C-cards at the same time!

All electronic navigation equipment is subject to external factors beyond the control of the manufacturer. Therefore such equipment must be regarded as an aid to navigation. The prudent navigator will, for that reason, never rely on a single source for position fixing and navigation.

About this manual

The technical data, information and illustrations contained in this publication were to the best of our knowledge correct at the time of going to print.
We reserve the right to change specifications, equipment, installation and maintenance instructions without notice as part of our policy of continuous development and improvement. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form, electronic or otherwise without prior permission from Simrad AS. No liability can be accepted for any inaccuracies or omissions in the publication, although every care has been taken to make it as complete and accurate as possible.

This manual combines operating information on the models listed below.
All models have the same keypad layout, but will differ according to built-in functions in the selected model. We recommend that you familiarise yourself with the information pertaining to the product that you have purchased prior to installation or use. This will facilitate full understanding of the many operating features and ensure straightforward installation - refer to the separate Installation manual, part no. 183-3450-102.

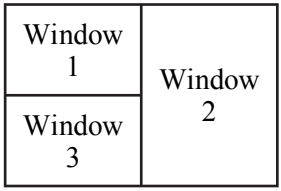
Features	CX34/44/54	CX34/44/54-D	CX34/44/54-E	CX34/44/54-DE
Chartplotter	•	•	•	•
DGPS	-	•	-	•
SDGPS	•	•	•	•
Radar function	•	•	•	•
Echosounder	Optional	Optional	•	•
Radar scanner and transducer for echosounder are optional.				

MOB In case someone falls overboard, press the [MOB] key and hold for 2 seconds (or activate an external MOB switch - hold for 5 seconds).

CLR Press [CLR] to confirm and reset the alarm if activated by mistake.

☞ Before pressing [ENT] to start MOB navigation:
• Reduce speed.
• Turn off Autopilot.

ENT Press [ENT] to start MOB navigation with all relevant data available for an efficient rescue operation and a precise track record of the vessel's movements.



Screen layout default after activating MOB.

Window 1: Data display will provide information of: Course, Bearing and Distance to MOB position, time elapsed since the incident occurred - first in seconds and then in minutes - if "*" is shown instead of numbers of minutes, means that the elapsed time has exceeded 9999 minutes. The two lines after the TIME shows the MOB position in Lat/Long.

Window 2: The chart display will provide a graphical impression of a man floating in the water at the MOB position together with a course line from actual position to the incident.

Window 3: Data display will provide information of: Date, time and position of MOB incident.

To turn MOB navigation off:
Press [GOTO], [3].

To recall the last registered MOB position, see section 9.8.

1 Product introduction and short description of how to use this manual. Safety warnings. How to get started, including: Dedicated function keys and short description of common functions.
2 System description. Overview of key functions and menu layout. Initial start-up. Turn power on/off.
3 The radar menu and its related functions are only applicable when optional radar scanner is connected. Radar quick menu gives access to e.g. Radar-Chart overlay and start/stop transmission.
4 Chart operation. List of info windows. GOTO menu with start of navigation modes. PLOT menu with choice of plotting and inserting waypoints, routes, lines, etc. Starting and stopping a track trailing the ship when sailing out and use as safe return route. Chart setup of chart and C-MAP functions - go to Appendix C for more information on C-MAP attributes.
5 The ECHO menu and its related functions are only applicable with built-in echosounder module and connected transducer, except section 5.11 'Depth & temperature diagram' which applies to all models in the CX34/44/54 series.
6 Pilot menu & navigation examples describe what information is available during navigation, MOB alarm and setting anchor. Different ways of obtaining a reliable position. Information of various positioning systems and how accurate they are.
7 The engine menu will provide a graphical engine monitoring system, which is compatible with engines outputting data via NMEA2000®.
8 Miscellaneous menu is where you will find special features as speed diagram, satellite status and DGPS + SDGPS information, etc.
9 Waypoint / route menu. Read where to find (and maybe edit) all the waypoints, routes, tracks, lines and targets stored in the internal memory and how to make new routes from the waypoints in the waypoint list together with 'Data transfer' to/from a PC-Planner, via NMEA interface or transfer data to store on a DataCard for safekeeping.
10 Setup menu is where you set up parameters, return do default settings and check out the interface connections, including SimNet control.
11 Check for troubleshooting, maintenance and specifications.

Installation - how to physically install boxes, cables, transducers and other devices - see separate Installation manual.

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1.1 Introduction and system familiarization

Congratulations on your purchase of **SIMRAD CX34/44/54 NavStation** - a combination of the latest GPS and SDGPS receiver technology and optional built-in differential receiver for accurate positioning, plus: detailed cartography and high performance radar and optional echosounder technology; all in a unique slim-line design with a bright 7" (CX34), 10" (CX44) or 15" (CX54) TFT color display.

The **radar system** with RadarChart overlay, dual EBL and VRM markers, direct Quick-range keys, off-center mode, etc. together with Dual Radar feature ... two radar displays in one screen, one for short range and one for long distance observations.

The **electronic chart system** includes a built-in world chart for rough planning and overview. The choice of chart system best suitable for the CX34/44/54 was carefully singled out to be the C-MAP mini cards NT+ or NT MAX. The optional C-cards are available world-wide at your local Simrad dealer.

The **Global Positioning System** is at this time and age the most common system used for navigation and positioning all over the world. Not only for maritime use, but also for land-based applications and aviation. The satellite-based system has been developed and is operated by the US Department of Defense in order to provide an accurate and reliable service, which include a 24-hour global coverage. The GPS system consists of approx. 24 satellites which orbit around the Earth at an altitude of approx. 20,200 km.
The satellites transmit perfectly synchronized data. However, depending on the position, the signals will reach the receiver at a slightly different time. By adding the measured time difference to the known position of the satellites it is possible to calculate the ship's position to within a few meters.

The **SimNet** data and control network provides high speed data transfer and control between Simrad products that are integrated as a total navigation, steering and communication system on board.

The optional **echosounder system** with selectable frequencies will provide an impression of Bottom expansion, VRM expansion, Shift, A-scope and White line.

DS34/44/54-CX Dual Station for the CX34/44/54 is available with a bright 7", 10" or 15" TFT color display. The main unit and the dual station are identical in design and operation.

How to use this manual? It is a good idea to make yourself familiar with the key functions, menu structure and rotation of pages (screens) described in

chapter 2 before you start out, and then proceed with section 2.7 Initial start-up. For quick location of a certain term, please check the “Glossary of terms” and the “Index” at the back of the manual. Also, “How to get started” further on in this chapter will give you a quick introduction to some of the many features you have access to.

The display examples shown in this manual are not always an exact copy of what you will see on the screen, as the presentation depends on your system configuration and choices of setup. How to interpret special marked key symbols etc. in the manual:

+/- Either the + (plus) or - (minus) key may be applied.

☞ Emphasizes important points.

1,3 Indicates that you should press the keys [1] and [3] to obtain what is written in *italic* next to the key.

1.2 Safety summary

Precaution: Do not open the equipment, only qualified persons should work inside the equipment. If the glass in the screen breaks, be carefull not to cut yourself on the sharp edges of the glass pieces.

☞ The lifetime of the internal battery is minimum 5 years. **If not exchanged before it goes flat, all data in the unit’s memory will be lost.** We strongly recommend that you frequently store your data on a Simrad DataCard. For exchange of battery, call your local Simrad workshop.

Power source, fuse and power cable: Check that the DC power supplied to the unit is within the range of 10 to 32 volts. Note that the appropriate fuse must be employed (see the fuse rating in section 11.4 Specifications). Ensure that the power cord is firmly attached.

Grounding: To reduce electrical interference and risk of electrical shock, properly ground the unit to the ship’s ground using the ground screw at the rear of the unit. Good grounding should also be exercised for connected equipment, refer to separate Installation manual.

Cleaning: Do not use any kind of strong solvents e.g. spirit, alcohol, gasoline or oils.

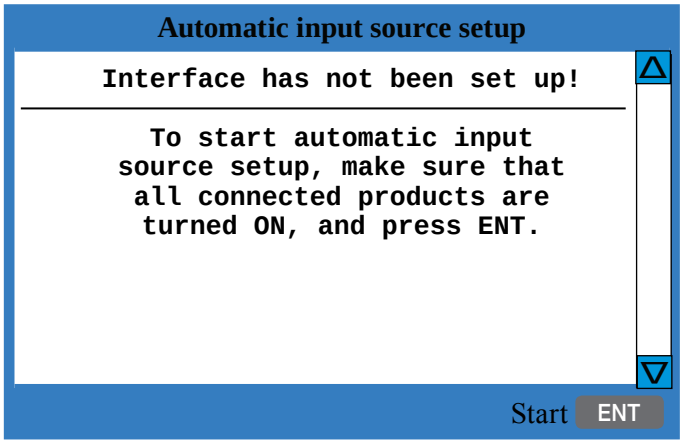
Software: The software version of the main unit (see start-up display) should always be informed in a service situation, or when ordering a Dual Station.

1.3 How to get started

When starting up for the very first time, the first time after loading a new software or after a master reset: Make sure that all hardware installation and electrical connections are completed in accordance to the installation instructions.

PWR *Press and hold the* [PWR] *key until you have a picture on the screen*

The system will perform a software update and check for communication activity. When finished, a new start-up window will be presented on the screen:


Automatic input source setup
Interface has not been set up!
To start automatic input source setup, make sure that all connected products are turned ON, and press ENT.
Start
ENT

After making sure that all connected products are turned ON:

ENT *Press* [ENT] *to start automatic input source setup*, - if a new product is connected later on, refer to section 10.6 Interface setup.

New window: Automatic input source setup listing Data type, Group and Source of connected units.

ENT *Press* [ENT] *to continue*

PAGE *Press* [PAGE] *to scroll through a quick guide which informs of the use of the keys and where you can enter owner's setup, etc.*
- the quick guide is also accessible via [MENU], [8], [5].

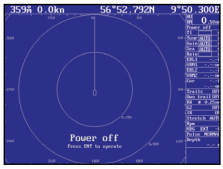
ENT *Press* [ENT] *when ready to assume normal operation*
- go to [MENU], [8], [2] if you wish to make adjustments to the interface setup.

☞ Heading is only available if a compass was detected at start-up.

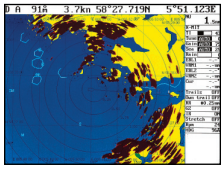
Your present position will automatically be updated within a few minutes. When ready, the ship symbol on the chart will flash, the position coordinates will stop flashing, and the *** will be replaced by actual course and speed figures.

1.3.1 Dedicated function keys

RADAR Short press will toggle overlay on/off:



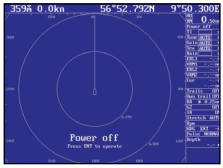
Radar display



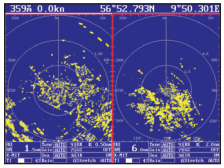
RadarChart overlay

The toggle function will require:
1. Valid position.
2. Valid heading from compass
3. Orientation set to NU
- refer to section 3.2.7.

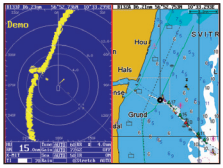
RADAR Long press will toggle between:



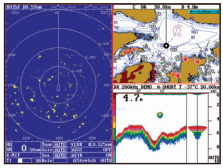
Radar display



Dual Radar

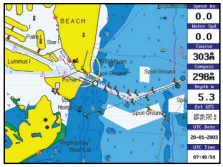


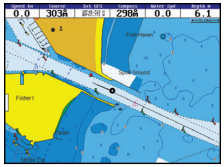
Radar & Chart



Custom screen

CHART Short press will toggle between:





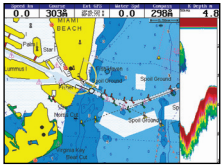
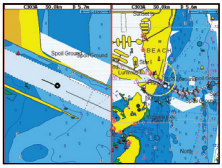


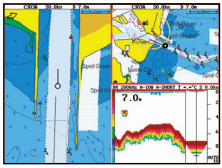
Chart + data field at the right side or top, or optional echo data.

CHART Long press will toggle between:

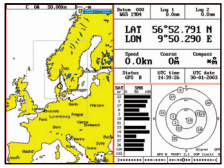
Chart display



Dual Chart



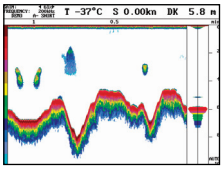
Custom screen1



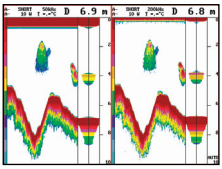
Custom screen2

With built-in Echosounder:

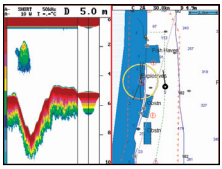
ECHO Long press will toggle between:



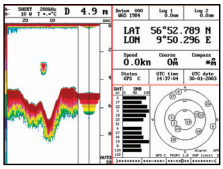
Echo + A-scope



Dual frequencies (CX44/54)



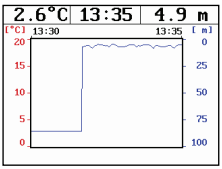
Custom screen1



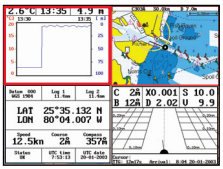
Custom screen2

Without built-in Echosounder:

ECHO Long press will toggle between:

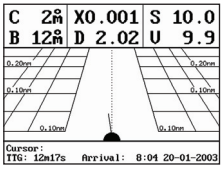


Depth & temp.diagram

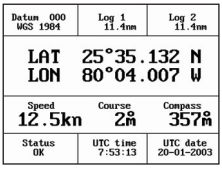


Custom screen

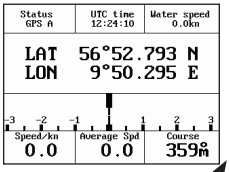
PILOT Short press will toggle between:



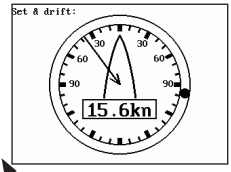
Highway



Position

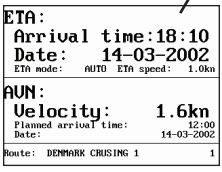


Dual Speed

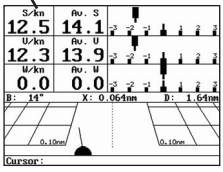


Set & Drift

When navigation mode is active, these two displays will be included:

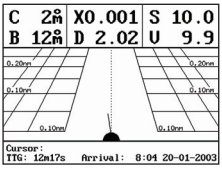


ETA & AVN

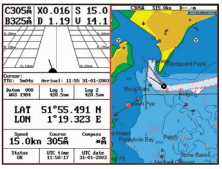


Trim & Highway

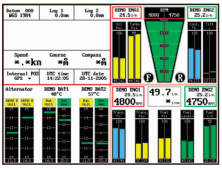
PILOT Long press will toggle between:



Highway

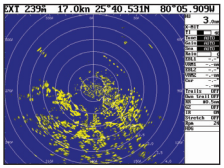
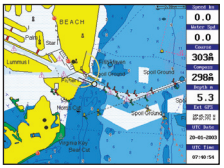
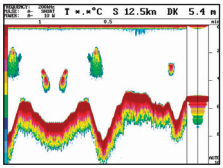
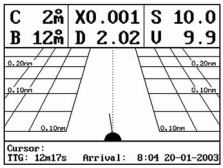


Custom screen1



Custom screen2

PAGE Short press will toggle between active pages under the main function keys. Long press will start automatic rotation of these pages (see section 2.1). Press any key to stop rotation.

1.3.2 Radar and radar functions

RADAR *Press the* [RADAR] *key to call up a radar display. Press again to toggle between the radar shortcut series*
- see display examples in section 1.3.1.

To start the radar
1. Press [ENT], [RADAR] to initiate a warming up period of two minutes (countdown of 120 seconds), and then the radar will go in Standby mode.
2. Press [ENT], [GOTO] to start transmission.

Select and adjust radar range
Press one of the numeric keys 1 - 9 to select a fixed range. Key **9** will select the largest range and key **1** the smallest.

ENT Press [ENT] to call up the Radar quick menu with access to e.g. Overlay Chart, Overlay User Data, activate EBL-VRM cursors, start and stop radar transmission, etc.

EBL Toggle the EBL-VRM1 cursors on/off directly from the [EBL] key.

CLR Turn off cursor. Long press on [CLR] will turn off all cursors on the radar screen.

ADJ The [ADJ] key will open for adjustment of the radar parameters. Use the cursor or the [ADJ] key to move around in the control panel; toggle between available values with the +/- keys or enter new values with the numeric keys. Press [ENT] to exit control panel.

In the Dual Radar display: after pressing the [ADJ] key to access the control panel, only half of the parameters will be visible. By pressing [ADJ] again will toggle between the 1st and 2nd half of the control panel.

1.3.3 Chart and chart functions

CHART *Press the* [CHART] *key to call up a chart display. Press again to toggle between the chart shortcut series*
- see chart examples in section 1.3.1.

C-MAP cartridges (standby)
Press [MENU], [8], [CHART] whenever inserting or removing a C-MAP card.

Select and adjust chart range/scale
Press one of the numeric keys 1 - 9 to select a fixed range (and chart level). Key **9** will select the largest range and key **1** the smallest. Use the +/- keys to adjust range in smaller steps.

Chart cursor and info windows
Press the cursor key to activate the cross hair cursor on the chart. Place the cursor on a C-MAP object e.g. a buoy or light to call up a small data window with details on the object. The data window will stay on screen for about 10 seconds or till cursor is moved. Press [ENT], [2] to access further details on C-MAP objects or user data i.e. waypoints, routes, etc.
Press [ENT], [5] to lock cursors in Dual Chart screen and [ENT], [5] to release cursors again. Press [CLR] to switch off cursor function. The ship symbol will now automatically 'home' and stay on screen.

Find nearest tide station or port services
1. Press [ENT], [3]
2. Move cursor up/down to select e.g. the Port/Marina symbol
3. Locate alternative port with the +/- keys, and press [ENT]
4. Press [ENT], [2] for more details on the facilities at the selected port.

Navigate to cursor (point and go)
1. Move the cursor to where you wish to go (first point)
2. Press [GOTO], [1] to start navigation.
3. You can now move the cursor to the next point and when ready to change leg, just press [GOTO], [2].

How to plot or insert waypoints and marks
• With cursor OFF (press [CLR])
Press [PLOT] and choose from:
[PLOT] Plot ship's position as mark.
[1] Insert ship's position. You can change the lat/lon figures, the symbol and the symbol's size and color.
[3] Insert specific waypoint. Suggested name, symbol, etc. can be altered.

[6] Plot ship's position as target.

• With cursor activated on the chart you also have access to:
[2] Plot waypoint - cursor position.
[6] Plot cursor position as target.

How to make a route on the chart
1. Place the cursor on the position for the first routepoint.
2. Press [PLOT], [4]: Make route.
3. Move cursor to next destination and press [PLOT] - (repeat).
4. Press [ENT] when ready to save the route. You can enter a new name for the route, change type and color for the course line.
5. Press [ENT] to accept and save the route.

How to make a route from existing waypoints stored in the WP list
1. Press [MENU], [7], [2] to call up the route list.
2. Press [CLR] Make new route from WP list.
3. Move cursor up/down to select the WP position for the first routepoint, and press [PLOT].
4. Repeat point 3 to add new WP positions to the route (the last routepoint in the right column is always empty, allowing that a new final routepoint can be added later on).
5. When the route is completed, press [ENT] to accept and go to Edit route.
6. In the Edit route display, you can give the route a new name, change type and color for the course line, etc.
7. Press [ENT] to accept changes and save the route.
8. Press [MENU] to go to the route list, which will provide an overall view of the number of routes stored in the memory.

How to edit a route - rubberbanding
• To move a point on the chart:
1. Place cursor on the point you wish to move.
2. Press [ENT], [1], [2].
3. Move cursor to new location.
4. Press [ENT] to complete.

• To insert a new point on the chart:
1. Place cursor on the leg where the new point is to be inserted.
2. Press [ENT], [1], [2].
3. Move cursor to where the new routepoint is to be placed.
4. Press [ENT] to complete.

How to start waypoint navigation (two ways)

• Place cursor on the symbol of the WP you wish to go to:

1. Press [GOTO], [2].
2. Press [ENT] to start navigation.

• Without placing cursor on the symbol of the WP you wish to go to:

1. Press [GOTO], [2].
2. Use the +/- keys to select the WP you wish to go to.
3. Press [ENT] to start navigation.

How to start route navigation (two ways)

• Place cursor on the routepoint you wish to go to first:

1. Press [GOTO], [3].
2. Select direction in route: Forward or Reverse.
3. Press [ENT] to start navigation.

• Without placing cursor on the routepoint you wish to go to first:

1. Press [GOTO], [3].
2. Use the +/- keys to select the name of the route.
3. Use the cursor to go to routepoint number, and select which one you wish to go to first by means of the +/- keys.
4. Select direction in route: Forward or Reverse.
5. Press [ENT] to start navigation.

Advance or stop navigation

• Press [GOTO], [1] to advance to next point in the route.
• Press [GOTO], [3] to stop navigation.

Start and stop track

1. Press [PLOT], [7] to call up ‘Start track’ window.
2. Before tracking is started, you can give the track a new name, make changes to track interval, track line type and color.
3. Press [ENT] to start track.
4. When you wish to stop tracking, press [PLOT], [8], [ENT].

1.3.4 Echosounder / Fishfinder (with built-in module)

ECHO *Press the* [ECHO] *key to call up an echosounder display. Press again to toggle between the echo shortcut series*
- see display examples in section 1.3.1.

Select and adjust echosounder range
Press one of the numeric keys 1 - 9 to select a fixed range. Key **9** will select the largest range and key **1** the smallest. Use the +/- keys to adjust range in smaller steps. Key 0 will select Auto Range.

A-scope - Press [ENT], [2] to toggle A-scope on/off. The strength of the actual echo is indicated by both width and color intensity.

Change frequency - Press [ENT], [1] to toggle between e.g. 50 and 200 kHz.

Gain - Adjust gain with cursor left/right to just below the point where you begin to see speckles of 'noise' on the screen.

Bottom lock display* - Press [ENT], [4] Bottom lock is a combination of standard echo display and extended area around the bottom.

Zoom display* - Press [ENT], [5] The expansion is a combination of standard echo display and extended area around the VRM - Variable Range Marker.

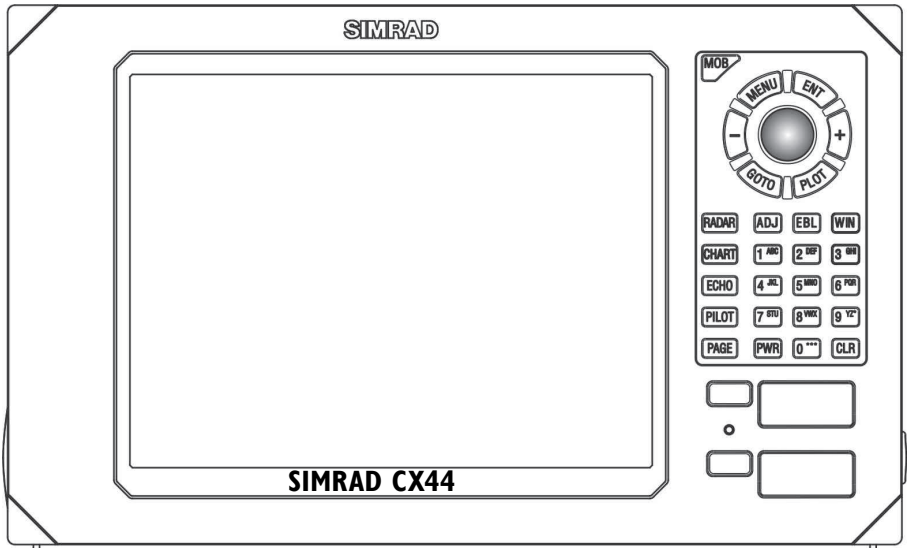
Shift display* - Press [ENT], [6] when operating in deep waters.
Select the range for an expansion window. The expansion window can automatically follow a changing bottom or be set manually by the +/- keys.

*Return to standard echosounder display by pressing [ENT], [3].

Presentation setup - Press [ADJ] from echo display to access the setup display for either 38 (CX44/54), 50 or 200 kHz. Press [ENT] to confirm changes, or leave the setup without having made any changes by pressing [MENU].

Echosounder setup - Press [MENU], [8], [ECHO] when you need to make any general settings, selecting a transducer or selecting demo mode etc.

Transmit power off - Press [ENT], [ECHO] to stop transmission in order to observe noise picked up by the transducer or to reduce power consumption.



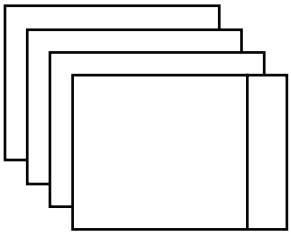
2.1 Fundamentals of the display and page system

The CX34/44/54 NavStation has a multi-function screen and data presentation system with full screen and different types of split screens. The series of pages under the function keys (situated in a vertical row to the right of the display) will in most situations be sufficient information for the operator.

In split screens consisting of up to four displays, the active display is indicated by a solid red frame. Use the [WIN] key to clockwise toggle between which display on the screen is active. Only active displays are operable.

The [PAGE] key differs from the other function keys. There are four pages under the [PAGE] key which can be set up to the presentation you prefer by exchanging an existing display in the PAGE system with a new one selected from a function key or via the menu - see next page. Single press on the [PAGE] key will toggle between the active pages under the function keys e.g.:

Radar display	Chart with data field	Echo display	Highway display



Long press on the [PAGE] key will start a rotation of the four pages in intervals of 5 seconds (increase/decrease the time in [MENU], [8], [1]). Press any key to stop rotation.

2.1.1 How to exchange a page in the PAGE system

The four pages in the PAGE system are collected from the RADAR, CHART, ECHO and PILOT menus in the sequence of which the function keys appear on the keypad ie. the first page is from the RADAR function, the second page is from the CHART function, the third page is from the ECHO function, and the fourth page is from the PILOT function. This sequence can not be changed, only the choice of display collected from each function can be changed e.g.:

PAGE *Press the* [PAGE] *key until the full screen Chart display appears*

MENU *Call up the menu bar, and...*

2,2 *collect the Dual Chart display*
- or you can toggle between the available displays in the CHART function by pressing (long press) the [CHART] key repeatedly.

The same applies for the other three pages in the PAGE system ie. press the [PAGE] key until a display from the RADAR, ECHO or PILOT function appears and then collect a new display from the appropriate menu.

☞ The display sequence under the function keys is the same as the display sequence in the matching menu.

2.1.2 How to select a new display in a custom screen

In custom screens with multiple window combinations, all displays, which are not main function displays, are exchangeable. It is also possible to change the right half of the screen from half screen window to two quarter windows and vice versa. Example:

MENU *Call up the menu bar, and...*

Highlight a function e.g. Route calculation in the WP/RTE menu.

WIN *Press* [WIN] *several times to check the screen image* (situated to the far right in the top line of the menu bar) *which windows the function can be placed into*

ENT *Press* [ENT] *to enter the highlighted function into the highlighted window*

☞ If the function text in the menu is red, the display will not be available for the selected window.

2.2 Key functions

Some of the key functions are general and can be applied at any time, other key functions are related to a certain menu(s) and can only be applied when in the appropriate menu.

MOB Press for two seconds to activate the MOB - "Man overboard" function.

MENU Turns the menu bar on/off. Exits any data display without taking any action (except the radar function).

ENT Confirms insertion and editing of data (except the radar function). Calls up quick menus, and information on marks, waypoints, etc. on chart together with several INFO windows from a chart display.

Moves cursor in data displays and charts + activates cursor on chart and radar. Moves left/right/up/down in the menu system.
Additional for Echosounder function: Adjusts gain (left/right), activates and moves VRM (up/down) in echo display.

+/- Changes radar, chart or echosounder range i.e. + (plus) zooms out for better overview (larger range) and - (minus) zooms in for greater details (smaller range). Toggles between available values.

GOTO Activates GOTO menu with choice of navigation modes, etc.

PLOT Activates PLOT menu with choice of plotting and inserting waypoints, routes, lines etc. together with starting or stopping a track of own ship.

RADAR Shortcut to Radar functions. Short press will toggle overlay on/off. Long press will toggle between Radar display in full screen, Dual Radar, Radar & Chart, and a custom screen.

CHART Shortcut to Chart function. Short press will toggle between different data fields on chart. Long press will toggle between Chart in full screen, Dual Chart, and two custom screens.

With built-in Echosounder function:
ECHO Shortcut to Echosounder functions. Long press will toggle between Echo display in full screen with A-scope, Dual Frequency (CX44/54), and two custom screens.

Without built-in Echosounder function:
ECHO Shortcut to Depth and temperature diagram, and one custom screen.

PILOT Shortcut to Pilot displays. With navigation mode inactive: short press will toggle between Highway, Position, Dual Speed and Set & Drift displays. With navigation mode active: short press will toggle between Highway, Position, Dual Speed, ETA & AVN, Trim & Highway, and Set & Drift displays. Long press will toggle between Pilot full screen and two custom screens.

PAGE Toggles between active pages under the four main function keys i.e. [RADAR], [CHART], [ECHO] and [PILOT]. Long press starts automatic rotation of these pages. Press any key to stop rotation.

ADJ Gives access to setup displays related to active display. Scrolls through adjustable parameters.

EBL Toggles EBL-VRM1 on/off. The Electronic Bearing Lines may be displayed in either degrees Relative “R” (to ship’s centerline) or True “T” (Relative to north), depending on the selected orientation (HU or CU).

WIN Toggles between active windows in split screen. The active window will have a solid red frame. Only active windows are operable.

0-9 The alphanumeric keys inserts and selects data in data displays. Keys 1-9 are also Quick-range keys, which each represent a fixed radar, chart or echosounder range. Key 0 will center the cursor/ship on the chart, activate auto range in sounder mode, and activate/deactivate ‘off-center to cursor’ on the radar display.

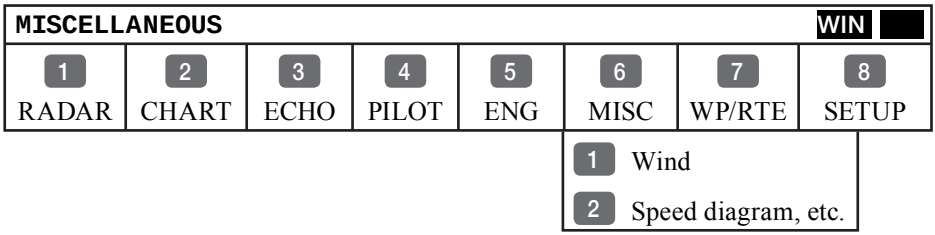
CLR Deletes data in enter or edit mode. Turns cursor off in active display. Long press will turn off all active cursors on radar display.
From radar control menu: Returns Tune, Gain or Sea to AUTOmatic mode, and clears the EBL and VRM readings.

PWR Power on - hold key depressed till you have a picture on the screen. Calls up a window where you can adjust the brightness in the screen, background light in keypad, and select Daylight displays, Night display or custom made color palettes. Hold two seconds to turn the power off.

2.3 Menu bar

MENU *Toggles the menu bar on/off*

To fit the complete menu bar across the screen, some of the menus have been abbreviated. However, the last selected menu will be highlighted, and if it's an abbreviation of the menu, then the complete menu title is written above the menu bar.



Having selected e.g. 6:MISC from the menu bar, its associated menus will drop down. Key in the number next to the function you wish to call forward, or use the cursor key to highlight the function and press [ENT].

If you want to switch to a different menu, use the cursor key left/right to move to the adjacent menu.

Most functions in the menus are general, and can be called forward at any time. Functions not currently available will have a different color from the rest of the functions. Not all functions are available in any window size i.e. full screen, half screen or quarter window. Use the [WIN] key to toggle between the windows in which the highlighted function can be presented. Keep an eye on the functions in the menu to see how they may change color as you toggle from window to window.

The menu bar will disappear from the screen at the selection of a function, or by pressing the [MENU] key. Besides, if not used, it automatically turns off after 30 seconds.

2.4 Menu layout

1 RADAR	2 CHART	3 ECHO
1 Radar	1 Chart	1 50kHz*
2 Dual Radar	2 Dual Chart	2 200kHz*
3 Radar & Chart	3 Custom screen 1	3 Dual Frequency (CX44/54)*
4 Custom screen	4 Custom screen 2	4 Depth & temperature diagram
		5 Custom screen 1
		6 Custom screen 2*

*) available with built-in echosounder function.

4 PILOT	5 ENG
1 Highway	1 Engine status
2 Position	2 Fuel and transmission
3 Dual Speed	3 Batteri status
4 ETA & AVN	4 2nd Engine status
5 Trim & Highway	5 2nd Fuel and transmission
6 Set & Drift	6 2nd Batteri status
7 Custom screen 1	
8 Custom screen 2	

6 MISC	7 WP/RTE
1 Wind	1 Waypoints
2 Speed diagram	2 Routes
3 Decca lanes	3 Route calculation
4 Loran C	4 Lines
5 Satellites	5 Tracks
6 DGPS	6 Targets
7 SDGPS	7 MOB data
8 DSC info	8 Data transfer

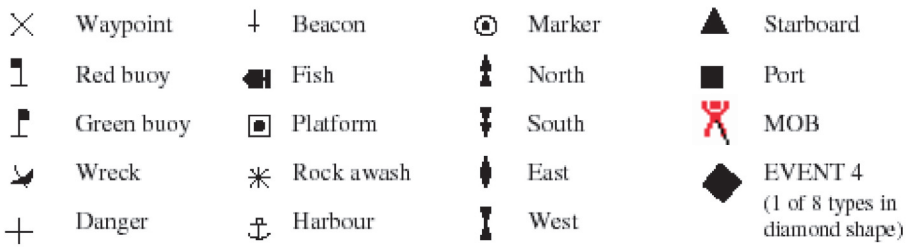
8 SETUP	
RADAR Radar setup	2 Interface setup
CHART C-MAP cartridge	3 Palette setup
ECHO Echosounder setup*	4 Factory settings
PILOT Pilot/Position setup	5 QuickGuide
1 Speed alarm, units & language	

When selecting a sub-menu in the SETUP menu, the display will always appear in a pop-up window, so once you have accepted the changes / exit the display, then the display will disappear from the screen.

*) available with built-in echosounder function.

2.5 Choice of symbols

Waypoints and other points appearing on the screen can be marked by one of 18 symbols + 8 event marks in small or large symbols:



2.6 Naming of routes, points etc.

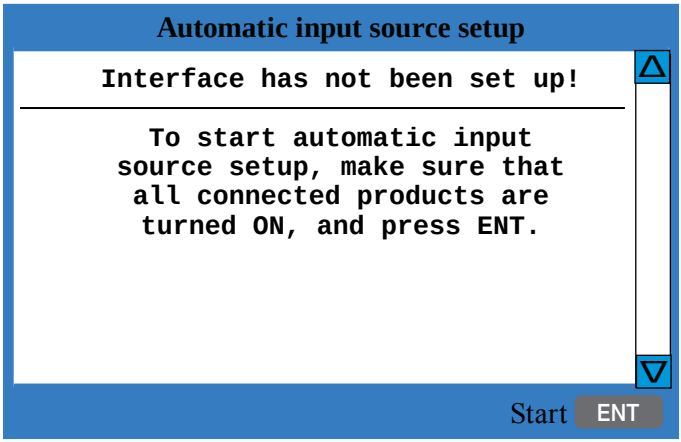
First select the key with the desired letter, then you can either repeat the keystrokes, which will toggle between e.g. A,B,C,1, or once you have selected one letter you can go back and forth in the alphabet by means of the +/- keys. Use the cursor key to go to next space or to go back one space if you make a mistake.
Depending on the selected language, the 0 (zero) key will hold special characters e.g. Æ Ø Å Ä Ö Ü Ñ, and the 9 (nine) key will hold: **.** - (empty space)
Press the [CLR] key to delete everything from cursor position and to the right of cursor in that row.

2.7 Initial start-up

When starting up for the very first time, the first time after loading a new software or after a master reset: Make sure that all hardware installation and electrical connections are completed in accordance to the installation instructions.

PWR *Press and hold the* [PWR] *key until you have a picture on the screen*

The system will perform a software update and when finished, a new start-up window will be presented on the screen:


Automatic input source setup
Interface has not been set up!
To start automatic input source setup, make sure that all connected products are turned ON, and press ENT.
Start
ENT

After making sure that all connected products are turned ON:

ENT *Press* [ENT] *to start automatic input source setup*, - if a new product is connected later on, refer to section 10.6 Interface setup.

New window: Automatic input source setup listing Data type, Group and Source of connected units.

ENT *Press* [ENT] *to continue*

PAGE *Press* [PAGE] *to scroll through a quick guide which informs of the use of the keys and where you can enter owner's setup, etc.*
- the quick guide is also accessible via [MENU], [8], [5].

ENT *Press* [ENT] *when ready to assume normal operation*
- go to [MENU], [8], [2] if you wish to make adjustments to the interface setup.

☞ Heading is only available if a compass was detected at start-up.

PWR *Press* [PWR] *again to adjust the lighting in the screen and select day or night display etc., move around in display by means of the cursor key and change settings with +/- keys, and...*

ENT *Confirm with* [ENT]

Your present position will automatically be updated within a few minutes. When ready, the ship symbol on the chart will flash, the position coordinates will stop flashing, and the *** will be replaced by actual course and speed figures - see section 6.3 Position display.

Do not start radar transmission before the antenna is warmed up, refer to section 3.2.3 Start transmission.

Select display language:

MENU *Call up the menu bar, and...*

8,1 *press* [8], [1] *to call up the language display*

Press up on the cursor to go to the bottom line in the display

+/- *Select language*

ENT *Confirm entry*

2.8 Turn power on

Starting up for the first time, or after loading a new software, or after a master reset - see section 2.7.
Starting up at any other time:

PWR *To turn on the CX34/44/54, press and hold the* [PWR] *key until you have a picture on the screen*

ENT *Press* [ENT] *when the system is ready*

2.9 Turn power off

PWR *Call up INFO window, and...*

PWR *Press and hold until the curtains begin to close*

The CX34/44/54 is now turned off. All the data and setups are saved and stored in the internal memory and, of course, will be available next time the unit is turned on.

2.10 Simrad WR20 Remote Commander (optional)

The WR20 is the first remote control that can both display and control the electronics on board when connected to the SimNet system. You can remotely command your NavStation with full MOB control from anywhere within a range of 100 m. You will have seamless control of pilot and navigation. You can make VHF calls from the WR20 and much, much more.

The new WR20 - your perfect helmsman

- Small rugged waterproof handset
- Display size: 35x25mm (1.4”x1.0”)
- Weight: 150 g
- Bluetooth Class 1
- Rechargable Li-Ion battery
- Backlit keypad
- Keypad lock
- Handy neck strap
- Environment: -10 to +55°C (-14 to +131°F)
- Dimensions H:133mm (5.2”), W:55mm (2.2”), D:32mm (1.3”)

3. Radar operation

The CX34/44/54 combines chart plotting with radar navigation. For first time users of Radar, we have included a basic description of the radar presentation with a basic understanding of how the controls affect the radar's operation and display.

The following paragraphs describe the control settings used for initial display setup, turn-on procedure, inclement weather operation and finally the turn off procedure. Radar controls are described in chapter 3.2.

3.1 Radar picture

The radar picture appearing on the display is a map-like representation of the area in which the radar is operating. Typically, the ship's position is at the center of the display. The operator may reposition or offset the ship's position up to 66% of the radius anywhere on the screen. The ship's dead ahead bearing is indicated by the heading line at the 0° relative bearing.

Coastline contours and landmass are generally depicted in solid filled yellow, purple, multi-colored (DAY settings) or green (NIGHT settings) echo areas - choose colors in Palette setup, section 10.7. Other surface vessels, and channel buoys, are displayed as smaller single "blips" or echoes. The radar picture or map can be viewed in many different ranges from own ship. These sizes are selected by the range controls. Greater detail of radar echoes nearby own ship is shown when the short or nearby range scales are selected. The best technique for assessing the radar presentation characteristics is to start with using a longer range scale and then switching to shorter ranges when nearby targets appear, or as the ship approaches the coastline, harbor, or other vessels in the area.

The long range scales (i.e. 3, 6, 12, 24nm) best show the overview of the ship's relationship to landmasses, weather fronts, and large ship targets at or beyond view.

3.1.1 Orientation

In the Head Up mode, the heading line always appears on the screen at 0° relative according to the on-screen bearing scale, and is coincident with the antenna beam passing the ship's bow. Thus the top of the displayed picture represents the direction in which the ship is heading.

All targets appearing on the display are "Relative" to own ship's position and heading. As you look outside at targets around you, you will see that the targets are appearing on the Radar display at the same relative bearing.

If the vessel alters course to the right, the displayed echoes will be displaced by an equal amount in bearing in a counterclockwise direction, and vice versa. These changes in the display pattern with ship movement is an extremely important characteristic to remember when maneuvering around nearby vessels, or buoys.

In North Up mode, the heading line will indicate the ship's heading in relation to the radar picture, which is presented in north up like a chart.

The Electronic Bearing Lines (EBL) are available radar tools used to measure bearings to radar targets from own ship. The bearing readouts may be in relative or true modes.

3.1.2 Effects of ship's movement

Radar images can be drawn in two ways on the radar display to show the ship's motion. The type of display modes are called "Relative motion" and "True motion". In Relative motion own ship is permanently fixed at the center of the display and radar echoes (targets) move in relation to your vessel. With no movement of the ship, a steady display of fixed radar echoes is shown. If the ship is moving ahead on a constant course, echoes appearing at the top of the display will move downward across the display. Your own ship's position will always remain at the center of the display.

The True motion display mode can be compared to your vessel moving on a map or chart. In True motion mode, the surrounding landmass echoes remain stationary on the screen and if your ship is moving at a constant course and speed, you will see your position move across the screen towards the edge of the display. Any

other targets which are underway will also be moving on the display screen at their True course and True speed. All motion seen on the True motion display is “TRUE” (meaning motion over the ground).

3.1.3 Environmental effects

The effects of weather and water surface conditions generally act to reduce the ability of radar to detect targets. Weather effects reduce the long range at which targets can be detected. Water surface clutter (waves) reduces the ability to detect targets close by. Either can obscure the echoes from targets that may prove dangerous to your vessel.

You can’t see wind on your radar screen, however you can see its effects when it produces waves and spray on the water surface. “Sea Return” is most pronounced in the direction from which the wind is blowing. Proper use of your Sea clutter control can reduce the effect of wind and waves, but care must be taken not to increase the control to the point where weak targets will be overlooked.

Rain, hail and snow can return echoes that appear on your radar screen as a blurred or cluttered area. Targets within the area of precipitation can be masked by the clutter. The maximum range of the radar pulse is greatly reduced as the energy of the radar beam is scattered and absorbed by the water droplets. Proper use of your Rain clutter control helps you to look into areas of precipitation to detect targets.

Buoys are moored to the bottom with concrete via chain. The chain is longer than the depth of the water to allow the buoys to ride in the current and go up and down with the tide. Unfortunately this allows the buoys to lean in the direction of the current. Radar reflectors built into the buoy do not work well when the side of the buoy is pointed to the sky. Therefore, the images of the channel markers may appear faint.

The iron mass and angles of the metal in the structure of a bridge can cause unpredictable interference patterns on your radar. It is not unusual for a reflected image to appear on the radar screen in front of you just as you pass under the bridge. A similar effect is also common on sailboats where the radar antenna is mounted close to an aluminum mast.
Overhead cable crossings can mimic a moving target on your radar screen. The cable target can appear to be on a collision course. The

entire length of cable does not appear on the screen, only a point on the cable, and that point keeps changing giving the illusion of a moving target.

3.1.4 Navigational echoes

Echoes displayed on the radar screen may be large or small, bright or faint, depending on the size and shape of the object and its angle relative to your radar antenna. The radar indication is not always the same as an observer's visual indication; a nearby small object may appear to be the same size as a distant large object on the radar. With experience, however, different targets can be identified by the relative size, brightness, and position of their radar echo returns.

Buoys and small boats are one example of targets that are sometimes difficult to distinguish from each other. Their movement in the waves do not present a consistent reflecting surface. Consequently, their echoes have a tendency to fade and brighten or sometimes to disappear momentarily. Although buoys and small boats often resemble each other, usually the motion of one target identifies the boat from the buoy.

High coastlines and mountainous coastal regions are often observed at the longest ranges of the radar. However, the first sight of landfill on the radar's longest ranges may be a mountain several miles inland from the coastline and not the actual coastline. The coastline may not appear on the radar until the vessel has approached land nearer the line of sight distance.

3.1.5 Racon (Radar Beacon)

A racon is a radar transponder which emits a characteristic signal when triggered by a ship's radar. The signal may be emitted on the same frequency as that of the triggering radar, in which case it is superimposed on the ship's radar screen automatically.
The racon signal appears on the screen as a radial line originating at a point just beyond the position of the radar beacon or as a Morse code signal displayed radially from just beyond the beacon.

3.1.6 Sea return

Not all radar echoes are produced by hard navigation items such as boats, buoys and land. Some radar echoes may be received from irregularities on the surface of the water, particularly at close range by breaking wave crests, particularly in windy weather and in heavy seas. These echoes appear on the radar screen on the short range scales as multiple small echoes next to own ship. Under high winds and extreme conditions the echoes from sea clutter may appear as dense background of clutter forming the shape of an almost solid disc, as far as one to three miles in all directions from own ship, but the worst direction is where the wind is blowing towards the ship. The radar has a sea clutter control, which can be used to minimize the effects of sea clutter pickup on the screen.

3.1.7 Storm and rain squall returns

The radar can also see echoes from rain or snow. Echoes from rain squalls consist of countless small echoes, continuously changing in size, intensity, and position. These returns sometimes appear as large hazy areas on the display depending on the intensity of the rainfall or snow in the storm cell. The cells usually may be visible at long distances due to their high altitude above the radar horizon and are very helpful for observing potential bad weather conditions. If the returns from rain squalls are not desired, the Rain clutter control can be adjusted to minimize the effect on the radar screen.

3.1.8 Blind sectors or shadow effect

Funnels, masts or derricks, (when located near the antenna array) may cause shadows. Shadow areas can be recognized since beyond the obstruction there will be a reduction of targets and noise intensity, although not necessarily a complete cutoff seen on the screen. However, if the shadow angle is more than a few degrees, there will be a blind sector.

In some shadow sectors the beam intensity may not be sufficient to obtain an echo from a very small object even at close range, despite the fact that a large vessel can be detected at a much greater range. For this reason, the angular width and relative bearing of any shadow sector should be determined at installation. Sometimes shadowing can be seen on the screen by increasing the radar gain until noise is present. Darker sectors indicate possible shadowed areas. This information should be posted near the display unit, and operators must be

alert for objects in these blind sectors.

☞ The DX45 and DX60 scanners have an advanced blind sector function where up to two sectors can be defined and cover a total of 90°. The sectors will be clearly marked on the screen and in order to eliminate ghost echoes (false reflecting targets), there will be no radar signals transmitted into the defined sector(s).

3.1.9 Side lobes

Echoes on the radar screen are not always the direct returns to the radar antenna. There are many types of false echoes that can appear on the display if certain conditions occur. The sections that follow, briefly describe the echo patterns that may be produced by these false echoes and their likely cause. It should be noted that the radar operator, through observation, practice, and experience usually can detect these conditions very quickly.

A very small part of the RF (Radio Frequency) energy from each transmitted pulse is radiated outside the radar's narrow beam, producing side lobe patterns. Side lobes normally have no effect from distant or small surface objects, but the echo from a large object at short range may produce an arc pattern on the radar screen similar to a range ring, or appear as a series of echoes forming a broken arc. Side lobe echoes normally occur at a range below 3 miles and usually can be reduced through careful reduction of the Gain or proper adjustment of the Sea clutter control.

3.1.10 Radar interference

Whenever two or more radar equipped vessels are operating within reception range of each other, mutual interference is likely when the radars are operating near the same frequencies. This interference usually appears on the screen as a series of small dots. The interference seems to move from the PPI center (center of radar screen), sometimes in a straight line, but more often in a long, sweeping curve. This type of interference is more noticeable on longer range scales. This does not, as a rule, impair the effectiveness of the radar as a navigational aid. Since the interference can be completely eliminated by turning IR "ON" in the function menu. The IR feature is normally left "on".

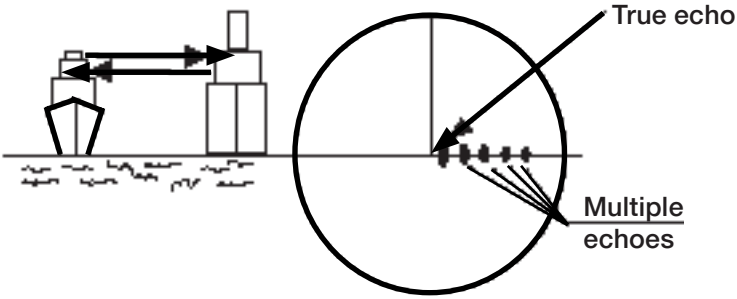
3.1.11 False echoes

Occasionally, echoes may appear on the screen at positions where there is no actual target. This type of target is called a False Echo. Sometimes they are known as Ghost Images, Indirect Echoes or Multiple Echoes depending on how they are generated.

Ghost images usually have the appearance of true echoes, but, in general, they are intermittent and poorly defined. A true ghost image retains a fixed relationship with respect to the true image and characteristically produces a more arc-like appearance with a tendency to smear on the screen. Ghost images are sometimes caused by large targets which have a wide, smooth surface as they pass by near your own ship.
Ghost images sometimes are referred to as indirect echoes. Indirect echoes may appear when there is a large target, such as a passing ship at a short range, or a reflecting surface, such as a funnel or spotlight on your own ship in line with the antenna. The signal, on first striking the smooth side of the large target, will be reflected, and these subsequent echo returns to the antenna are shown on the display. However, the same reflection may also hit other masts or obstacles and then be picked up by the radar antenna with enough strength to appear as a target on the radar screen at various locations.

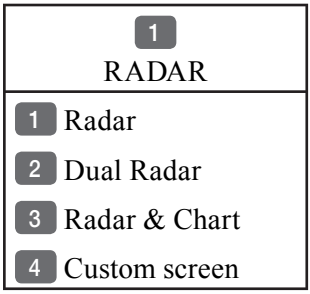
Multiple echoes could appear if there is a large target having a wide vertical surface to your own ship at a comparatively short range. The transmitted signal will be reflected back and forth between the wide vertical surface of the target and your own ship.

Thus, multiple echoes will appear beyond the true target's echo on the same bearing as shown below.



3.2 Radar menu

The Golden Rule! Today's radars are packed full of neat features designed to make your cruising more enjoyable and safer. Use these features when you can, but remember the old axiom KISS (keep it simple sailor). If a target shows on the display, there most likely is something there. If there are no targets shown on your display, it doesn't guarantee there are no other objects around. *Maintain a good visual watch, proceed at a safe speed and enjoy your boating.*



The displays obtained from this menu can easily be accessed from the main function key [RADAR] - see section 3.2.1.

To access RadarChart overlay - see section 3.2.6.

The **Radar** display will be presented in full screen with the radar control menu placed in the right side of the display. Press [ADJ] to access the control menu, where the most common adjustments are made - see section 3.2.5.

The **Dual Radar** display requires a full-screen presentation, with the standard display in the left half of the screen and the secondary radar display in the right half of the screen. The two half-screen radar displays can be set up and operated independently - see section 3.2.8.

The **Radar & Chart** display requires a full screen presentation, with the radar display in the left half of the screen and the chart display in the right half of the screen - see section 3.2.9.

The **Custom screen** will present multiple window combinations (section 3.2.1), where the radar display will be fixed in the left half window and the two quarter windows i.e. (default) a chart display and an echo display can be exchanged with different displays.

To access one of the displays via the menu e.g.:

MENU
1,1

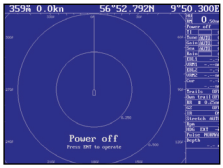
Call up the menu bar, and...
press [1] *and* [1] *to call up the Radar display in full screen*

3.2.1 Shortcut to the pages in the radar-series

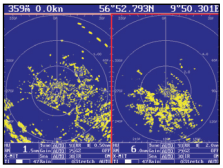
The RADAR function is one of the main functions in the CX34/44/54. Each page under the [RADAR] key will include a window representing the radar function. It is not possible to exchange main function displays with a new display. Refer to section 2.1, 2.1.1 and 2.1.2 for further information on the display and page system.

From any display:

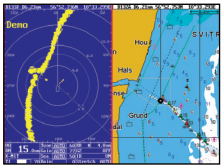
RADAR Long press on the [RADAR] key will toggle between:



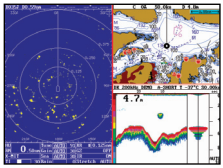
Radar full screen



Dual Radar



Radar & Chart

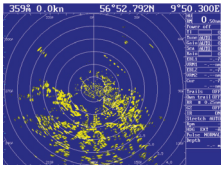


Custom screen

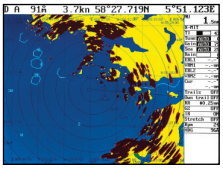
All the displays are fixed, except for the two quarter windows in the custom screen, which can be exchanged with a different display selected via the menu.

From radar display:

RADAR Short press on the [RADAR] key will toggle overlay on/off - see section 3.2.6.



Radar display



RadarChart overlay

3.2.2 Initial radar display setup

After the installation is completed, check the Radar setup (section 10.1) if the **Scanner height** is correct and the **Heading adjust** is zero degrees to ship's center line. If not, carry out adjustments as described in the Radar setup. The Scanner type is preset to Auto detect and as such, the system will automatically initiate the correct parameters for the connected scanner.

3.2.3 Start transmission

Normally, when starting the transmission, it will take approx. two minutes for the antenna to warm up and be ready for transmission. For initial start-up and after long storage, see below.

Make sure nobody is standing close to the radar scanner when it starts to rotate after the transmission is activated!

RADAR *Shortcut to radar display*

ENT *Call up the Radar quick menu*

RADAR *Turn 'Power on'*

The legend 'Detecting' will appear on the screen while the system is checking which scanner is connected. When the scanner is detected, a countdown to zero will appear on the screen which will allow two minutes for the scanner to warm up before it enters Standby mode and is ready for use.

When ready to start transmission:

ENT *Call up the Radar quick menu*

GOTO *Start transmission*

☞ Starting up the first time after installation or after long storage (6 months), the antenna will need an extra 20 minutes to warm up, so after Power on and going into Standby, the radar must be left in Standby mode for the extra 20 minutes it will take to warm up the antenna properly. This way you will contribute to the lifetime of the magnetron in the radar antenna.

3.2.4 Shut down procedure for the radar function, or back to 'Standby'

To disengage the radar transmission temporarily, you can return the radar function to Standby mode:

ENT *Call up the Radar quick menu*

GOTO *Enter Standby mode*

To resume the radar transmission:

ENT *Call up the Radar quick menu*

GOTO *Start transmission*

To shut down the radar function:

ENT *Call up the Radar quick menu*

RADAR *Turn 'Power off'*

3.2.5 Standard radar display

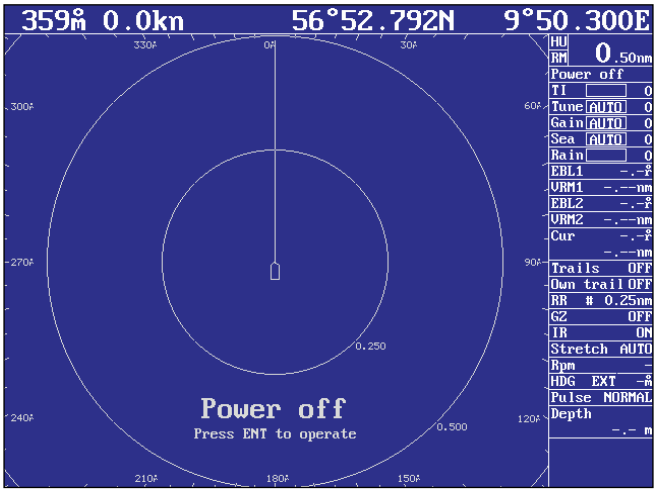
The standard radar display will require full screen presentation.

RADAR *Shortcut to radar display*

Or load the radar display via the menu:

MENU *Call up the menu bar, and...*

1,1 *load the Radar display*



The top line in the radar display indicates the course and speed of the ship together with the position of the ship, which will be exchanged with the position of the cursor when activated on the radar display (heading input is required). The control menu will appear in the right side of the radar display in full screen.

‚Press ENT to operate' - refer to section 3.2.6 Radar quick menu.

Use cursor to activate and move the cross cursor on the radar background - press [CLR] to remove cursor.

EBL

Activate EBL-VRM1, and use cursor to move EBL-VRM1 around in the radar background - more details further ahead in this section - press [EBL] again, or [CLR] to remove EBL-VRM1.

ADJ

Open for adjustment

Use cursor to move around in the control panel

+/-

Toggle between available values

0-9

Key in new values

ENT

Confirm changes by pressing [ENT] *(or* [MENU]*)*

There is no regret or “exit without making any change”-key from the control panel. As soon as the keys are pressed to change a function, the actual change is immediately carried out.

Orientation can be set to:

HU RM (Head-Up in Relative Motion): The heading line always appears on the display at 0 degrees as the antenna beam passes the bow of the vessel. Targets appearing on the display are relative to your own ship. Head-up mode gives an easy interpretation of the situation around your boat.

NU (North-Up): In this mode, targets are displayed at their measured distances and direction relative to north. North being at the top of the display. To operate in NU mode will require valid heading from connected compass.

CU (Course Up): The heading line appears to point upwards within the range of the rotation resolution (default is 15°). If the vessel turns more than e.g. 15°, the radar picture will also turn to make the heading line continue pointing upwards.

TM (True Motion): Own ship moves past land, buoys and fixed objects. To operate in TM mode will require valid GPS position and compass heading.

RM (Relative Motion): The ship will stay in the center of the screen or at an offset position and targets will appear relative to own ship's position.

☞ If receiving the alarm: "Heading missing" or "Position missing" the system will change to Head-Up in Relative Motion after 60 seconds and at the same time inform of "Changing to HeadUp" in a pop-up window.

0.50nm indicates the displayed range in the radar picture.

Power off indicates that the radar function is not active.

TI is the Tuning Indicator, which provides an indication of the receiver tuning.

Tune – make manual adjustments to Tune by means of the +/- keys, and return to AUTO mode by pressing [CLR].

Tune control – is a variable control used to tune the receiver in the radar antenna for maximum target returns on the display. If no land or ship targets are available, the operator may tune for maximum sea clutter. The tuning indicator will show the strength of tuning peak conditions and is tuned for maximum deflection. Tuning of the radar should be performed on a 3nm range scale or higher.

Gain – Auto mode can be used in most situations, but in some situations manual adjustment leads to better performance of the system. Make manual adjustments to Gain by means of the +/- keys, and return to AUTO mode by pressing [CLR].

Gain control adjusts the gain level of the radar's receiver. The Gain control level is usually set for the best target presentation with a slight noise speckle in the background on the 12 or 24nm range. A semi-automatic Gain reduction is used on shorter ranges to improve target definition. Use some caution when adjusting the Gain control. If gain is set too low, small or weak targets may be missed. If the gain is set too high on short ranges, the display may become excessively covered with noise speckle making target observation difficult.

Sea – Auto mode is optimized for open sea and is recommended when the distance to shore is over 300 meters. Closer to shore and when approaching a harbor, choose Harbor mode.
Make manual adjustments to Sea by means of the +/- keys, and

return to AUTO mode by pressing [CLR].
Press [CLR] to toggle between HBR (Harbor) and AUTO mode.

Sea control – is used on the shorter ranges to suppress the effects of sea clutter close to own ship by reducing the nearby gain level. It can effectively reduce the strength of the mass of random echoes received from nearby sea clutter for up to approx. 1 to 2 nm depending on wave and sea conditions. Sea control is set to reduce the strength of these echoes such that the clutter appears only as intermittent small dots, yet stable targets can still be distinguished.

☞ If manual adjustments are made, the setting will affect the system's ability to detect targets and remove sea clutter in heavy sea situations.

Rain – the rain clutter filter enhances the leading edge of a target whereas the signal behind the leading edge area of rain will be depressed. This can also be of great advantage on shorter ranges to distinguish between two very close echoes on the same bearing which may otherwise merge and appear as one echo.

☞ To properly adjust for rain clutter:
1. Set rain clutter to zero.
2. Slowly increase rain clutter until the hazy area caused by the rain or snow become less dense. Increasing it too much will not only remove the rain clutter, but also other weak targets.
   Note! Since Rain and Snow are continually changing in size and density, tweaking of the rain clutter adjustment is necessary to maintain the best results. Manual fine tuning of Gain and Sea may improve the performance.

EBL (Electronic Bearing Line) - bearing and distance (read-only) from ship's position to cursor. Two independent EBLs are available - see section 3.2.6.

VRM (Variable Range Marker) - bearing and distance (read-only) from ship's position to VRM cursor. Two independent VRMs are available - see section 3.2.6.

Cursor - bearing and distance (read-only) from ship's position to cursor.

Trails after targets – toggle between OFF, 30sec, 1min, 2min, 5min, 10min, 15min, 30min, PERM (permanent).
Using the Trails feature will show the trails of target movement as an

after-glow or wake behind the moving targets or own ship.
If the range scale is changed, the trails are cleared and new trails will be drawn on the screen. The trails are drawn for anything that moves on the screen, including sea gulls, sea clutter, buoys, and shoreline.

Own trail – toggle between OFF and ON. This function will require that 'Trails' (above) is activated and mode of orientation is TM.

RR = RangeRings – toggle between # *.** (as display example), *.** (no RR figures), OFF (no RR)

GZ (Guard Zone alarm) – The use of the Guard zone feature built into the radar can detect approaching vessels entering your guard zone. You can use the guard zone while you are moving or when anchored to protect you in a full 360 degrees. The audio alarm can be sounded from the unit or through an external speaker/buzzer wired into the system – see Electrical connections in Installation manual.

☞ In Head Up mode the GZ relates to the vessel and in North Up or Course Up it relates to geographic north.

Define the guard zone by means of the EBL and VRM markers:

1. Press the [EBL] key and move cursor (EBL-VRM1) to make the left side and top of the guard zone.

2. Press [ENT], [2] and move cursor (EBL-VRM2) to make the right side and bottom of the guard zone. The guard zone will be generated clockwise from EBL1 to EBL2.

3. Press [ADJ] and move cursor to the GZ line. Use the [+] key to toggle between: IN / OUT / OFF.

   IN = the alarm will be activated if any target enters the defined guard zone.
   OUT = the alarm will be activated when all targets have left the defined guard zone i.e. at least one target must be present inside the GZ when the function is activated.

4. Press [ENT] to exit the control panel.

5. Press and hold [CLR] to clear the EBL-VRMs. This will give a better view of the defined guard zone.

☞ The guard zone is not available in the secondary radar display in Dual Radar mode.

IR (Interference Rejection) – will reduce false echoes from other radars nearby, see section 3.1.10.

Stretch – toggle between AUTO, ON, OFF.
AUTO (default) - small targets are enhanced at ranges above 3 nm.
ON - all targets will be enhanced.
OFF - all targets will remain unchanged.

Rpm – will determine the scanner rotation (full screen presentation). Manually, the rotation speed can be set to either 24 or *48 rpm, depending on the scanner type (use +/- keys).
*Running 48 rpm (double update rate) is liable to reduce the lifetime of the mechanical parts.

☞ DX45 and DX60 scanners only - toggle between HIGH, LOW, AUTO.
HIGH (default) - is preset to 50 rpm.
LOW - is preset to 30 rpm.
AUTO - the rpm will automatically switch between LOW and HIGH according to the preselected speed value (preset to 10 kn), so the rpm will stay on LOW at speeds up to 10 knots.
Note! To change the preset values, see Radar setup in section 10.1.

HDG – your heading will be shown (full screen presentation) in degrees from connected compass. If no compass is connected, you can use the course (COG) from the built-in GPS module by changing "Use COG as internal heading" from NO to YES in the interface setup. Press [MENU], [8], [2], and then press [PLOT] repeatedly until the tab reads Compass.

☞ When using the GPS course as replacement for heading input, the accuracy will be reduced in relation to speed, wind and current.

Pulse - can be set to SHORT, NORMAL or LONG.
NORMAL (default) will not change the presentation of targets.
SHORT - (press the [-] key to access) will enhance target resolution at range 0.5-6.0 nm. However, this setting may result in making some smaller targets disappear.
LONG - (press the [+] key to access) will enlarge targets on screen and improve target detection. However, this setting will also enlarge any noise picked up.

Depth - readout in meters, feet or fathoms from built-in echosounder function or external depth source.

3.2.6 Radar quick menu

From active radar display:
ENT *Call up the Radar quick menu*

Radar quick menu	
RADAR	Power On
GOTO	Transmit
1	Activate EBL-VRM1
2	Activate EBL-VRM2
3	Activate Cursor
4	Show Navigation Point
5	Heading line
6	Clear trails
CHART	Show Overlay Chart
PLOT	Show Overlay User Data
ADJ	Overlay Chart Setup
MENU	Exit

If working with both EBL-VRM cursors, you can toggle between which one should be active via the quick menu.

RADAR **Power On/Off** - Turning power on will activate scanner warm up and enter standby mode, see section 3.2.3.

GOTO **Transmit/Standby** - Transmit will start transmission and antenna rotation, see section 3.2.3.

1 **Activate EBL-VRM1**
A dotted line + circle will be drawn on the screen. Use the cursor key to move the EBL-VRM1 cursor. By placing the square cursor point over a target or over an object, it will indicate the distance to same.

To turn off: Press [ENT], [1] again to hide EBL-VRM1.
Long press on [CLR] will turn off all active cursors.
Toggle on/off directly from the [EBL] key.

2 **Activate EBL-VRM2**
A dotted line + circle will be drawn on the screen. Use the cursor key to move the EBL-VRM2 cursor. By placing the square cursor point over a target or over an object, it will indicate the distance to same.
To turn off: Press [ENT], [2] again to hide EBL-VRM2.
Long press on [CLR] will turn off all active cursors.

3 **Activate Cursor** - will activate cursor on radar display. Press again to turn off cursor, or press [CLR]. Long press on [CLR] will turn off all active cursors on the radar display.

4 **Show/Hide Navigation Point** - this function will require a valid position, and heading input from connected sensor. When a navigation mode is active, the approaching waypoint can be shown on the radar display. Turning the navigation mode off will temporarily disable the function, because there is nothing to show - but when navigation is started up again, the function will also become active again. You will not have to turn it on and off all the time. Press [ENT], [4] Hide Navigation Point if you no longer want the waypoint to be shown on the radar display.

5 **Heading Line** - by pressing the [5] key the heading line will disappear for approx. 5 seconds.

6 **Clear Trails** - will clear all trails, both from targets and own boat.

CHART **Show/Hide Overlay Chart** - dedicated chart overlay on the radar display. This function will require a valid position, and heading input from connected sensor. The type of chart data/objects shown on the screen can be adjusted in the 'Overlay chart setup', see section 3.2.7.

PLOT **Show/Hide Overlay User Data** - plotted user data overlay on the radar display. This function will require a valid position, and heading input from connected sensor. The type of user data shown on the screen can be adjusted in the 'User data' group in the 'Overlay chart setup', see section 3.2.7.

ADJ **Overlay Chart Setup** - will open for change to the current setup. The changes will only affect the chart used with the overlay - see section 3.2.7, and section 4.5.2 Description of chart features.

MENU **Exit** Radar quick menu

3.2.7 RadarChart overlay

Radar and chart images merged into one presentation takes away the guesswork of interpreting radar information by providing the full picture. The overlay is a feature under the radar function, which consists of three layers of information. The first layer is the chart with the ship's symbol indicating precisely where you are at all times. The second layer is the radar image with targets. And finally the third layer adds the coast lines, buoys, lights, user data and other vital navigational data which always will be shown on top of the radar targets. Radar operation will be as usual with full access to the radar control menu. The dedicated chart used with the overlay is adjustable via the Radar quick menu.

The overlay function will require the following conditions: Valid position, valid heading information, and Radar orientation mode must be in NU (North Up) or CU (Course Up). The overlay is disabled in HU (Head Up).

The overlay function can not be activated in the 'Radar & Chart' display.

From active radar display:

RADAR *Short press will toggle the overlay on/off*

Calling up the overlay function via the [RADAR] key will automatically show the dedicated chart together with any user data plotted in the area presented on the screen.

The amount of information in the overlay is controlled via the Radar quick menu where you can Hide/Show Overlay Chart or Hide/Show Overlay User Data, or enter Overlay Chart Setup to turn off some of the objects if the screen is too cluttered with information.

ENT *Call up the Radar quick menu*

CHART *Hide/Show Overlay Chart*
- special chart dedicated to the overlay.

PLOT *Hide/Show Overlay User Data*
- plotted waypoints, routes, etc. stored in the memory.

If you choose to e.g. Hide Overlay User Data, then the Overlay

Chart will be shown on the radar display and a short press on the [RADAR] key will toggle the overlay on/off, but now only with the Chart data, as the User Data is currently 'hidden'.

Color presets for the overlay display
Different color combinations of radar targets and chart or radar background color are available:

PWR *Call up the Light and power pop-up window*

1-9 *Select a different number in the color Palette*

ENT *Confirm the change*

The color palettes from 1 to 4 are fixed, palette 9 is preset with multi color radar targets, the rest (5-8) can be customized to suit individual needs. See how in section 10.7.

Adjustment of overlay settings
The special chart used with the overlay is not used anywhere else in the system and therefore has its own individual setup. A description of the chart features can be found in section 4.5.2. To access the overlay chart setup, the active window must contain a radar display, and then:

ENT *Call the Radar quick menu*

ADJ *Open for change in the overlay chart setup*
- see display example next page.

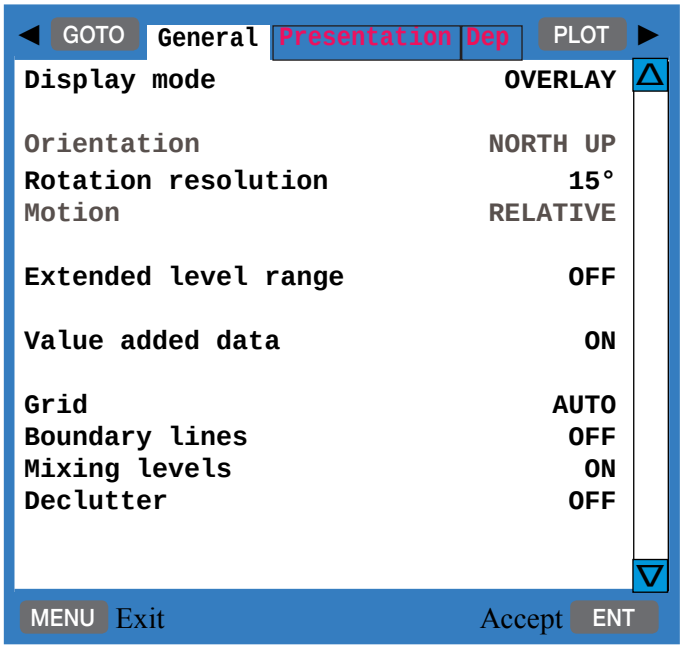
The tabs indicate which groups are available in each display mode e.g. in the above example, OVERLAY display mode, you have access to the groups in black: General, Areas and User data. The two groups in red i.e. Presentation and Depth are only adjustable in CUSTOM display mode. See further on in this chapter for more details.

+/- *Select display mode:* OVERLAY, FULL, CUSTOM, SIMPLE, FISHING, LOW

PLOT *Go to the next group*

GOTO *Step back to the previous group*

Scroll up/down in the chart settings
- functions in light grey are not accessible in selected display mode.



+/- *Toggle between available settings*

ENT *Confirm changes, or...*

MENU *Abandon Chart setup without making any changes*

Display modes in the overlay chart setup
There are 6 different display modes to choose from: OVERLAY (default), FULL, CUSTOM, SIMPLE, FISHING and LOW. When a group is shown in red or a function is shown in light grey it is not available in the selected display mode. The default settings in the various display modes are:

Group: General - specification of chart display in general.
The available functions are according to display example on previous page for all display modes and any change of the default settings will be applied in all display modes.

Group: Presentation - specifies presentation of marine, land and chart topics
The default settings in this group are fixed in all display modes, except for *Custom where it is possible by the user to turn a feature ON (shown on the chart) or OFF (not shown on the chart), etc. - see next page.

C-MAP features	Overlay	Full	*Custom	Simple	Fishing	Low
Marine:						
Names	OFF	ON	OFF	ON	ON	OFF
Nav-Aids	INT	INT	INT	INT	INT	INT
Lights	OFF	ON	ON	OFF	OFF	OFF
Light Sectors	OFF	ON	OFF	OFF	OFF	OFF
Signals	ON	ON	ON	ON	ON	OFF
Buoys	ON	ON	ON	ON	ON	OFF
Attention Areas	ON	ON	ON	ON	ON	OFF
Tides, currents	ON	ON	ON	ON	OFF	OFF
Nature of seabed	ON	ON	ON	OFF	ON	OFF
Ports	OFF	ON	OFF	ON	OFF	OFF
Tracks, routes	ON	ON	ON	OFF	OFF	OFF
Name tags	OFF	OFF	OFF	OFF	OFF	OFF
Land:						
Natural features rivers	OFF	ON	OFF	ON	OFF	OFF
Natural features	OFF	ON	OFF	OFF	OFF	OFF
Cultural features	OFF	ON	OFF	OFF	OFF	OFF
Landmarks	OFF	ON	OFF	ON	OFF	OFF
Traffic	OFF	OFF	OFF	OFF	OFF	OFF
Points of interest	ON	ON	ON	OFF	OFF	OFF

Group: Depth - specifies the presentation of depth lines, levels, etc. on chart The default settings in this group are fixed in all display modes, except for *Custom where it is possible by the user to alter the features. The color indication for depth levels 1, 2 and 3 is determined by the color palette in the SETUP menu.

C-MAP features	Full	*Custom	Simple	Fishing	Low
Soundings	ON	ON	ON	ON	OFF
Underwater objects	ON	ON	ON	ON	ON
Depth Lines	ON	ON	ON	ON	OFF
Depth Lines>	0000m	0000m	0000m	0000m	0000m
Depth Lines<	9999m	9999m	5m	9999m	5m
Depth Areas	ON	ON	ON	ON	OFF
Depth					
Level 1	0-002m	0-002m	0-002m	0-002m	0-002m
Level 2	2-009m	2-009m	2-009m	2-009m	2-009m
Level 3	9-MAX	9-MAX	9-MAX	9-MAX	9-MAX
Depth tags	OFF	OFF	OFF	OFF	OFF
Depth range					
Min	0000m	0000m	0000m	0000m	0000m
Max	9999m	9999m	9999m	9999m	9999m

Group: Areas - specifies the presentation of different areas on chart
The default settings in this group are the same for all display modes and any change of the default settings will be applied in all display modes.
The features can be changed from FILLED to CONTOUR:

C-MAP features	All display modes
Land areas	FILLED
Depth areas	FILLED
Caution areas	FILLED
Dredged areas	FILLED

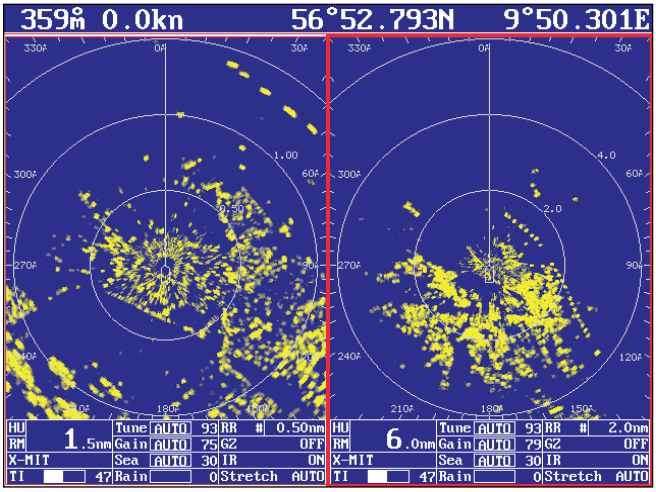
Group: User data - user defined objects can be visible or invisible on chart.
The default settings in this group are the same for all display modes and any change of the default settings will be applied in all display modes.

Chart features		Defaults and choice of settings
Waypoints		All the features in the user data level that are set as default to ON= shown on chart, can be changed to OFF= not shown on chart.
Non active waypoints	ON	
Waypoint names	ON	
Waypoint depths	ON	
Routes		Non active routes and tracks, all lines and all targets are default to: AS SELECTED= the choices made for a particular route etc via the menu e.g. MENU, 7, 2, ENT, ENT - Edit route, where 'Course line' can be set ON or OFF.
Non active routes	AS SELECTED	
Route names	ON	
Tracks		
Non active tracks	AS SELECTED	
Track names	ON	
Lines		'AS SELECTED' can also be changed to 'ALL ON'= shown on the chart, or 'ALL OFF'= not shown on the chart.
Lines	AS SELECTED	
Line names	ON	
Targets		
Targets	AS SELECTED	
Target names	ON	

3.2.8 Dual radar display

MENU
1,2

Call up the menu bar, and...
load the Dual Radar display


359° 0.0kn 56°52.793N 9°50.301E
1.00
4.0
2.0
HU 1.5nm Tune AUTO 93 RR # 0.50nm
RM Gain AUTO 75 GZ OFF
X-MIT Sea AUTO 30 IR ON
TI 47 Rain 0 Stretch AUTO
HU 6.0nm Tune AUTO 93 RR # 2.0nm
RM Gain AUTO 79 GZ OFF
X-MIT Sea AUTO 30 IR ON
TI 47 Rain 0 Stretch AUTO

Standard radar display Secondary radar display

This feature requires a full-screen presentation, with the standard display in the left half of the screen and the secondary radar display in the right half of the screen. The two half-screen radar displays can be set up and operated independently.

To make adjustments in the standard radar display (left half screen), the window must be active:

WIN
Toggle between active windows on screen

ADJ
Open for adjustment
- by pressing [ADJ] again will toggle between 1st and 2nd half of control menu.

Use the cursor to move around in the control menu
- and toggle between available values with the +/- keys, and insert data by the numeric keys.

ENT
Confirm changes by pressing [ENT] *or* [MENU]

To make adjustments in the secondary radar display:
WIN
Make the secondary radar display active

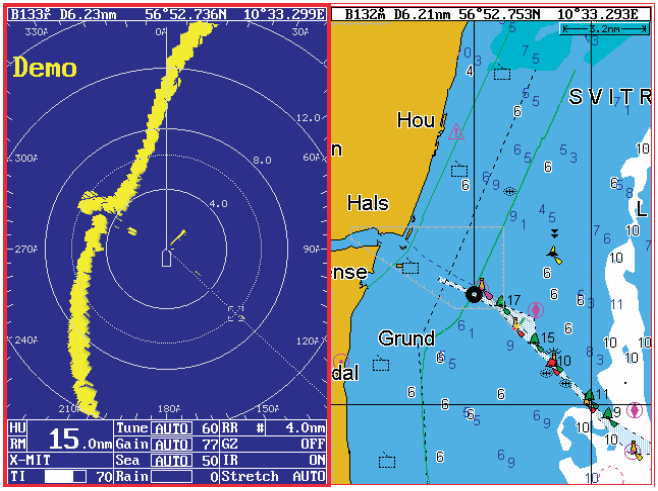
Carry out adjustments by using the same procedures as described in section 3.2.5 for the standard radar display, except for the guard zone which is not available in the secondary radar display.

☞ Indication of HDG (heading), Rpm (scanner rotation speed) and Pulse is only available in full screen presentation.

3.2.9 Radar & Chart display

MENU
1,3

Call up the menu bar, and...
load the Radar & Chart display



The RadarChart overlay is not available in this display!

WIN

Toggle between active windows on screen

• **Synchronize cursors or scale and range** (will require a valid position, and heading input from connected sensor)
In synchronized mode the orientation mode of the chart is set to the same as the radar orientation. When position data is available the chart scale is adjusted to approximately the same range as the radar. When heading data is available and a cursor is active, the chart cursor will be set to the radar cursor position.

The lock function is controlled by the radar display, which means that e.g. moving the cursor in the radar display will move the cursor in the chart display as well. However, when moving the cursor in the

chart display, nothing will happen in the radar display, because the synchronization is 'one way only'.

☞ The lock function is automatically activated when the required data is available. When the data is not available, the radar display and the chart display will both function as individual standard displays. This synchronized feature is only available in the Radar & Chart display.

3.2.10 General features for the radar operation

• **Alarms:**
The alarms that can appear in connection with the radar operation, are:

- Bearing pulse alarm (check if scanner is rotating)
- Bearing zero alarm (check if scanner is rotating)
- Changing to Head-Up alarm (indicates the orientation mode has changed - see section 3.2.5 and 3.2.7)
- Communication failure alarm (check connection to scanner)
- Communication time-out failure alarm (no communication between display and scanner)
- Guard Zone alarm (see GZ under section 3.2.5)
- Heading missing alarm (check connection to compass)
- Position missing alarm (see Position update under section 6.3)
- Rotation lock alarm (check if scanner is rotating)
- Trigger fail alarm (check connection to scanner)

• **Off-center mode** (only when operating in RM - Relative Motion) – permits the operator to obtain a greater view in the direction of interest. Place the cursor within 2/3 of the display and press the [0] key. The ship's position will now be moved to the cursor position and thereby increasing the desired area of view. To deactivate the Off-center mode, press [CLR] and [0]. This will replace the ship's position back at the center of the display. If the radar system is turned off while the Off-center mode is on, at next power up the offset mode will still be on.

• **PLOT function** – will require that a heading sensor (Gyro or Compass) is connected to the CX34/44/54. If so, then you can plot the actual cursor position on the radar display by pressing [PLOT], [2] from the radar display, and thereby save the position in the WP-list as a waypoint i.e. you can give the plotted waypoint a new name/ number, symbol, color, etc.

• **Radar colors** - There are several color settings to choose from for the radar display. See Palette setup ([MENU],[8],[3]).

• **Range** - The extension of the range depends on how powerful the connected radar antenna is. There are several ways of adjusting the range on the screen, the quickest way is:

1-9 *Use one of the shortcut keys to quickly go to a different range:*

Press	[1] = 0.125 nm	[2] = 0.25 nm	[3] = 0.50 nm
	[4] = 0.75 nm	[5] = 1.5 nm	[6] = 3 nm
	[7] = 6 nm	[8] = 12 nm	[9] = 24 nm

+/- *Or you may use the +/- zoom keys to go to a different range*

ADJ Or from the active control panel: use the cursor key to highlight the current range scale, then adjust the range scale with approx. 10 percent each time you press the +/- keys.

• **Show navigation waypoint on radar display** - (will require a valid position, and heading input from connected sensor)
When a navigation mode is active, the approaching waypoint can be shown on the radar display:

ENT *Call up Radar quick menu*

4 *Show navigation waypoint*

Turning the navigation mode off will temporarily disable the function, because there is nothing to show - but when navigation is started up again, the function will also become active again. You will not have to turn it on and off all the time. Press [ENT], [4] Hide navigation waypoint if you no longer wish to have it shown on the radar display.

• **Targets** - The **shape** of the target has a direct affect on the image displayed. A flat surface at right angles reflects a good image. Flat surfaces at shallow angles reflect very poor images. A concave surface will concentrate the reflective energy and display an image larger than normal. Convex surfaces will scatter the energy and display week images. A conical surface may not display any image.

The **texture** of the target surface also controls the amount of reflected signal, and therefore the image displayed. A smooth surface is a good reflector, while rough surfaces tend to break up the reflection.

Composition - materials such as metal and water are good reflectors. Others, such as wood and fiberglass are poor reflectors.

3.3 Demo mode

For the purpose of a demonstration, the radar function has a demo mode, which can present a simulated radar picture without having a radar scanner connected.

☞ Warning! Any adjustments/setups already made to the radar function will return to default settings when selecting the Demo mode.

To activate the demo mode:

MENU *Call up the menu bar, and...*

8 *Open the SETUP menu*

RADAR *Load the Radar setup*

- a warning will pop up that you are about to change settings for the radar, press [MENU] to abandon, or [ENT] to continue.

Use the cursor to go to 'Scanner type', and select 'Demo' with the +/- keys

ENT *Accept change & exit Radar setup*

ENT *Call up Radar quick menu*

RADAR *Turn 'Power on'*

- the legend 'Detecting' will appear on the screen for a short while, then a countdown of 20 seconds will start before the system enters Standby mode. It now says 'Standby' on the screen.

ENT *Call up Radar quick menu*

GOTO *Start transmission*

+/- *Use the +/- keys to adjust the range and presentation*

The legend **Demo** will stay in the top left of the screen to indicate the demo mode is active.

Bring the Demo mode in Standby:

ENT *Call up Radar quick menu*

GOTO *Go to Standby mode*
- this way you can easily return to the simulated radar picture by repeating the [ENT] and [GOTO] sequence.

Turn off the Demo mode and return to normal operation:

ENT *Call up Radar quick menu*

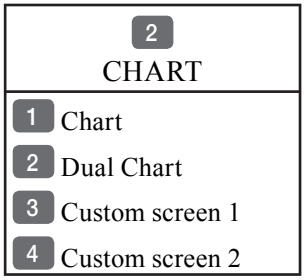
RADAR *Turn 'Power off'*

MENU *Call up the menu bar, and...*
8 *Open the SETUP menu*
RADAR *Load the Radar setup*
- a warning will pop up that you are about to change settings for the radar, press [MENU] to abandon, or [ENT] to continue.

Use the cursor to go to 'Scanner type', and select 'Auto detect' with the +/- keys

ENT *Confirm changes & exit Radar setup*

4. Chart menu



The displays obtained from this menu can easily be accessed from the main function key [CHART] - see section 4.1.

RadarChart overlay is accessed via the radar display - see section 3.2.7.

☞ For safety reasons, navigation with electronic charts should always be combined with authorized paper charts.

The chart display opens for the built-in world chart, as well as the optional, detailed C-MAP electronic chart system, which of course will require that a C-MAP NT+ or MAX C-card is inserted in one of the drawers below the keypad. The chart appearing in full screen with smaller range as default, is the only chart which can be inserted into a different display via the menu.

The Dual Chart display will provide a chart in two different scales, one for detail (smaller range) and one for overview (greater range).

The two custom screens will present multiple window combinations (section 4.1), where the chart with greater range as default will be fixed in a quarter window. The chart with smaller range will be fixed in the left half window in both custom screens. Adjustments can be made individually to each chart (section 4.5).

To access one of the displays via the menu e.g.:

MENU
2,1

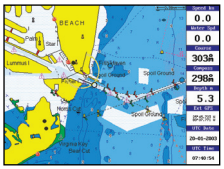
Call up the menu bar, and...
press [2] *and* [1] *to call up a Chart in full screen*

4.1 Shortcut to the pages in the chart-series

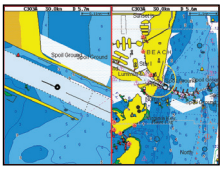
The CHART function is one of the main functions in the CX34/44/54. Each page under the [CHART] key will include a window representing the chart function. It is not possible to exchange main function displays with a new display. Refer to section 2.1, 2.1.1 and 2.1.2 for further information on the display and page system.

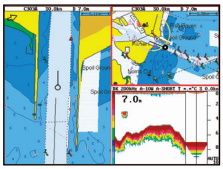
CHART

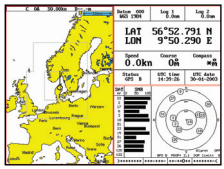
From any display:
Long press on the [CHART] key will toggle between:



Chart

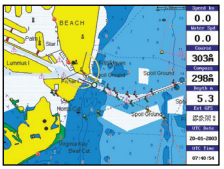

Dual Chart

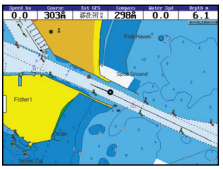

Custom screen 1

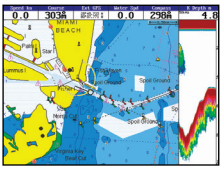

Custom screen 2

CHART

From full chart display:
Short press on the [CHART] key will toggle between different presentations of the data field on the chart e.g.:







4.1.1 Data field on chart

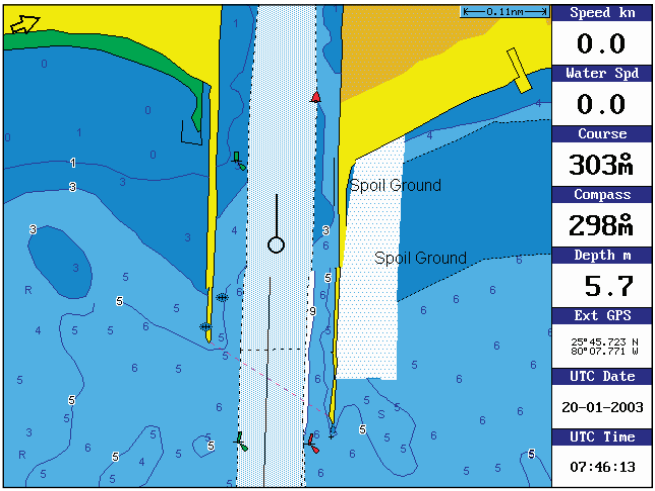


Chart range indicator (0.11nm) can be set ON/OFF in 'Show range' - section 4.5 Chart setup under General.

During chart update/ redraw a progress bar will cover the chart radar indicator.

Depending on different situations, the data field on the chart display will give you the ship's current speed, speed through water, course, *position in lat/

long, compass and depth indication, bearing and distance to either approaching point or cursor position; together with time and date in local or UTC.
*)Refer to section 6.3 Status indicator and accuracy.

4.1.2 Ship symbol

The ship symbol indicates the present position on the chart and the vector informs of the actual heading (input from compass) or true course (course over ground). There is a built-in autohome function which automatically moves the chart to maintain the ship symbol in the display (with cursor off).

0 *** Press [0] to instantly center the ship on the chart (with cursor off).

4.1.3 Cursor function

With chart display active:

Press the cursor key to activate the chart cursor (cross hairs)

CLR Press [CLR] to turn the chart cursor off

☞ As default (section 4.5 Chart setup under General), the chart cursor will automatically switch off if not used in the last five minutes. The chart will update and bring the ship's position to the center of the screen.

Use the cursor key to move cursor in any direction on the screen - the chart will automatically adjust when cursor reaches the edge of the screen.

0 *** Press [0] to instantly center the cursor on the chart (with cursor on).

☞ In data displays the cursor will be shown in form of either a ruling box around the active field, or the active field will be highlighted.

4.1.4 Range or zoom function

With chart display active:

1-9 Press one of the numeric keys to quickly change the chart scale:

[1] = 1:600	[2] = 1:2,000	[3] = 1:6,000
[4] = 1:20,000	[5] = 1:60,000	[6] = 1:200,000
[7] = 1:600,000	[8] = 1:2,000,000	[9] = 1:6,600,000

- Press the minus key to zoom in for details (smaller range)

+ Press the plus key to zoom out for overview (greater range)

Using the extended level range will give the best result when changing chart range. First use one of the numeric keys (Quick-Range 1-9) to select the required chart, then 'fine tune' the range within the same chart level by using the +/- keys. Depending on the actual chart, you can zoom in or out two to three times before the extended level range is switched off and the chart changes to a new level of details.

☞ The extended level range can be toggled OFF/ON in General settings (default = OFF) - see section 4.5 Chart setup.

Chart details may not be available in all scales in all areas. Non-covered areas will be marked as hatched or all blue/white with coordinate grid (when Grid is set to AUTO (default) in chart setup), depending on the actual scale - see section 4.5 Chart setup for more details in regard to what can be shown on the chart and what you may choose not to have shown.

The **built-in world chart** can be zoomed up/down in six steps, from a scale of approx. 1:33,000,000 to 1:2,000,000.

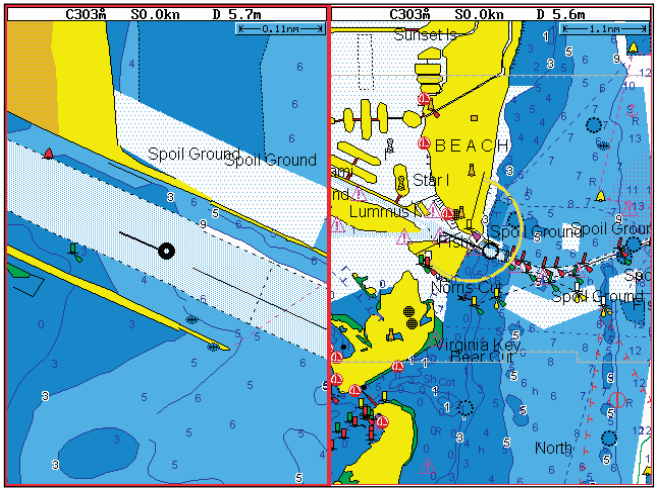
An **over-zoom function** enables you to zoom beyond the chart, which automatically is switched off and replaced by a lat/long coordinate grid. In this mode, the scale can go down to 1:600.
'Auto chart select' must be switched OFF, see section 4.5 Chart setup.

4.2 Dual Chart display

It is possible to have two charts in different scales on the screen at the same time, one for detail and one for overview. Each chart can be operated individually, and each will have its own cursor and individual chart setup.

MENU
2,2

Call up the menu bar, and...
press [2] *and* [2] *to call up the Dual Chart display*



WIN

Press the [WIN] key to select active display (red frame).

ENT

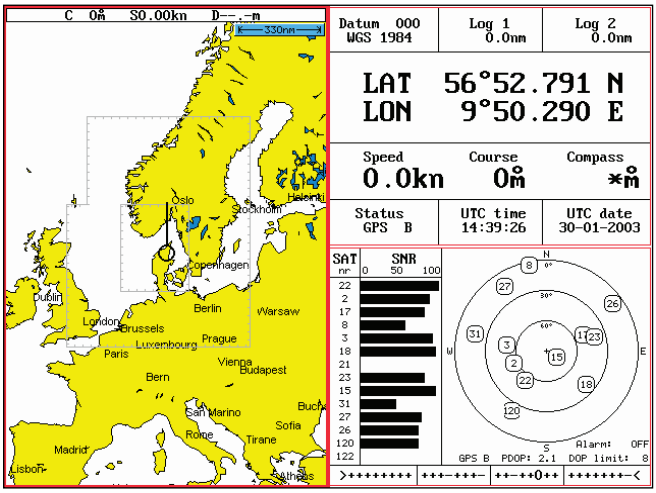
Press the [ENT] key to call up the chart's Quick menu with access to e.g. Chart info, Lock cursors to the same position in both charts on the screen, etc. - refer to sections 4.4.2 for more details.

ADJ

Press the [ADJ] key to call up the chart setup for the active chart - refer to section 4.5 for more details.

4.3 Chart custom screens

The two custom screens in the chart menu consist of multiple window combinations e.g.:



The displays, which are not related to the chart function, can be exchanged with a different one. It is also possible to change the right half of the screen from two quarter windows to half screen window, and vice versa. See section 2.1.2 how you go about changing the displays.

4.4 Chart quick menu

Access the chart quick menu from active chart display. The functions available depends on the actual situation - refer to sections 4.4.1 to 4.4.7.

4.4.1 Cursor inactive

ENT With chart in active window, and with cursor off, press [ENT] to *call up the quick menu* with the following to choose from:

Scale: 1:6600000		Actual chart scale
No user data at ship's position		
1	Edit user data	Inactive function
2	Chart info	Refer to Appendix C
3	Find nearest port services	Refer to Appendix C
4	Bearing and dist from A to B	Inactive function
5	Lock cursors	Inactive function
8	Tidal current prediction	Refer to Appendix C
0	Ship to center	
PAGE	More user data	
MENU	Exit	Exit info window

0 *Ship to center* will update the chart and place the ship's position in the center of the chart display.

PAGE *More user data* will toggle between available data on the ship's position.

4.4.2 Cursor active but not placed on any object or data

ENT With chart in active window, and cursor active but not placed on any object or user data, press [ENT] to *call up the quick menu* with the following to choose from:

Scale: 1:6600000	Actual chart scale
No user data at cursor position	
1 Edit user data	Inactive function
2 Chart info	Refer to Appendix C
3 Find nearest port services	Refer to Appendix C
4 Bearing and dist from A to B	
5 Lock cursors	
8 Tidal current prediction	Refer to Appendix C
0 Cursor to center	
PAGE More user data	Inactive function
MENU Exit	Exit info window

4 *Bearing & dist. from A to B* will quickly provide the bearing and distance from your current cursor position (A) to an arbitrary point (B). Move cursor to point B and see the calculation in the small info window. Press [CLR] to exit the function.

5 *Lock cursors* will lock the cursors in two chart displays on the same screen and thus make the cursor movements synchronized. To return to individual cursor control in each chart display, press [ENT], [5] to 'Release cursors' again. See also 'Lock cursors' in Appendix A.

0 *Cursor to center* will update the chart and place the cursor position in the center of the chart display.

4.4.3 Cursor placed on waypoint

ENT With chart in active window, and cursor placed on a waypoint, press [ENT] to *call up the quick menu* with the following to choose from:

WP found	
Name: WP 1 LAT 57°15.504N LON 9°17.249E	
1 Edit user data	
2 Chart info	Refer to Appendix C
3 Find nearest port services	Refer to Appendix C
4 Bearing and dist from A to B	Refer to section 4.4.2
5 Lock cursors	Refer to section 4.4.2
8 Tidal current prediction	Refer to Appendix C
0 Cursor to center	Refer to section 4.4.2
PAGE More user data	
MENU Exit	Exit info window

1 *Edit user data* opens a new info window:

Waypoint	
1 Edit	Edit name, symbol, color etc.
2 Move	Move waypoint with cursor
CLR Delete	Delete waypoint
MENU Exit	Exit info window

PAGE *More user data* will toggle between available data on cursor's position

4.4.4 Cursor placed on route leg or line section

ENT With chart in active window, and cursor placed on a route leg or line section, press [ENT] to *call up the quick menu* with the following to choose from:

Route leg found: 5-6	
Name: RTE 1 Leg: B130° 34.26nm Total: 5 legs 143.1nm	
1 Edit user data	
2 Chart info	Refer to Appendix C
3 Find nearest port services	Refer to Appendix C
4 Bearing and dist from A to B	Refer to section 4.4.2
5 Lock cursors	Refer to section 4.4.2
8 Tidal current prediction	Refer to Appendix C
0 Cursor to center	Refer to section 4.4.2
PAGE More user data	
MENU Exit	Exit info window

1 *Edit user data* opens a new info window:

Route leg	
1 Edit leg	Open new info window to edit route leg
2 Insert point	Move cursor to insert new point
3 Edit	Open new info window to edit route
CLR Delete	Delete the whole route
MENU Exit	Exit info window

PAGE *More user data* will toggle between data on routepoint and route leg.

4.4.5 Cursor placed on routepoint or linepoint

ENT With chart in active window, and cursor placed on a routepoint or linepoint, press [ENT] to *call up the quick menu* with the following to choose from:

Routepoint found 5	
Name: RTE 1 From start: 108.8nm To end: 34.26nm	
1 Edit user data	
2 Chart info	Refer to Appendix C
3 Find nearest port services	Refer to Appendix C
4 Bearing and dist from A to B	Refer to section 4.4.2
5 Lock cursors	Refer to section 4.4.2
8 Tidal current prediction	Refer to Appendix C
0 Cursor to center	Refer to section 4.4.2
PAGE More user data	
MENU Exit	Exit info window

1 *Edit user data* opens a new info window:

Routepoint	
1 Edit point	Open new info window to edit routepoint
2 Move point	Move point with cursor
CLR Delete point	Delete routepoint
3 Add point	Add point to route - in beginning or at end.
4 Edit	Open new info window to edit route
5 Delete	Delete the whole route
MENU Exit	Exit info window

PAGE *More user data* will toggle between data on routepoint and route leg

4.4.6 Cursor placed on trackpoint

Trackpoints are not as easily recognized as Routepoints, you may have to move the cursor along on the track to locate a trackpoint.

ENT With chart in active window, and cursor placed on a trackpoint, press [ENT] to *call up the quick menu* with the following to choose from:

Trackpoint found 3	
Name: TRACK 1 Total: 836 points	
1 Edit user data	
2 Chart info	Refer to Appendix C
3 Find nearest port services	Refer to Appendix C
4 Bearing and dist from A to B	Refer to section 4.4.2
5 Lock cursors	Refer to section 4.4.2
8 Tidal current prediction	Refer to Appendix C
0 Cursor to center	Refer to section 4.4.2
PAGE More user data	
MENU Exit	Exit info window

1 *Edit user data* opens a new info window:

Trackpoint	
CLR Delete point	Delete trackpoint
1 Delete points from A to B	See below
2 Edit	Open new info window
3 Delete	Delete the whole track
MENU Exit	Exit info window

Press [1] to delete points from A to B - move cursor to point B, and press [ENT] to delete all trackpoints between cursor position on chart and point B.

PAGE *More user data* if cursor is placed on a MOB track you can toggle between data on MOB symbol and data on MOB track. The symbol and track are edited separately.

4.4.7 Cursor placed on target

ENT With chart in active window, and cursor placed on a target symbol, press [ENT] to *call up the quick menu* with the following to choose from:

Target found	
Name: TARGET 1 LAT 57°02.825N LON 7°45.555E	
1 Edit user data	
2 Chart info	Refer to Appendix C
3 Find nearest port services	Refer to Appendix C
4 Bearing and dist from A to B	Refer to section 4.4.2
5 Lock cursors	Refer to section 4.4.2
8 Tidal current prediction	Refer to Appendix C
0 Cursor to center	Refer to section 4.4.2
PAGE More user data	
MENU Exit	Exit info window

1 *Edit user data* opens a new info window:

Target	
1 Edit	Edit name, color, position etc.
2 Move	Move point with cursor
CLR Delete	Delete target
MENU Exit	Exit info window

PAGE *More user data* will toggle between available data on cursor's position

4.4.8 GOTO menu

GOTO Call up the GOTO menu with access to navigation modes:

Select NAV mode	
1	Cursor
2	Waypoint
3	Route
4	Track
5	Anchor guard
MENU	Exit

To select “Cursor” navigation will require that the chart cursor is active.

“Waypoint”, “Route” and “Track” navigation requires that a waypoint, route or track is stored in the memory.

For further details on the different NAV modes, refer to section 6.9 Navigation examples.

Anchor guard - when setting anchor, a pre-set alarm distance will be activated, so in case the ship is drifting too far away from the anchored position, the system will initiate a visual and acoustic alert - refer to section 6.10 Anchor guard.

If pressing the [GOTO] key while one of the NAV modes is active, this pop-up window will appear on the screen:

Navigation is ON	
1	Advance
2	Restart to approaching point
3	Turn NAV OFF
MENU	Exit

Press [1] to advance to next waypoint in the route (Route navigation). Press [2] if you for some reason have drifted off course and wish to restart navigation from your actual position to the approaching point.

4.4.9 PLOT menu

The CX34/44/54 is designed to make navigation easy and safe. Waypoints can easily be plotted with a single keystroke, or be inserted via the keypad. Making routes and drawing lines are done directly on the chart. Very straightforward, uncomplicated and with a high level of confidence as you can follow your actions 'live' on the chart.

PLOT Call up the PLOT menu with the following to choose from:

PLOT new data	
PLOT	Plot mark - ship
1	Insert mark - ship
2	Plot waypoint - cursor
3	Insert waypoint
4	Make route
5	Draw line
6	Plot target
7	Start track
8	Stop track
9	Set vertical mark
MENU	Exit

- with built-in Echosounder.

PLOT From any display: Plot and save mark on ship's position, including actual depth indication. Preset name sequence: SHIP 1, SHIP 2 etc.

1 From any display: Plot and save waypoint. Ship's position is suggested, but you can key in a new position from keypad, change the location name (cf.section 2.6), or change the symbol (cf.section 2.5) and the color (select with +/- keys). Any changes made will be new presets for plotting/insertion of ship's position.

2 From active chart display with cursor on: Plot and save cursor position as a waypoint. Preset name sequence: WP 1, WP 2 etc.

3 From any display: Plot and save waypoint. The position coordinates are filled with zeroes, so you can key in the position you want from the keypad, change the location name (cf.section 2.6), or change

the symbol (cf.section 2.5) and the color (select with +/- keys). Any changes made will be new presets for plotting/insertion of the cursor position.

- From active chart display with cursor on: Same options as above, except that the zeroes in the position coordinates have been exchanged with the cursor position.

- From active echo display: Plot and save waypoint from echogram. Move cursor and press [ENT] to register spot as waypoint, including actual depth indication. Name, symbol, color etc. can be changed.

4 From active chart display with cursor on: You can quickly make a route by means of the cursor and the [PLOT] key. The present cursor position will be the first position of the route you are about to make. Move cursor to next position, and press [PLOT]. Continue in this manner until the route is completed.
Existing waypoints can be used for making the route, simply by placing the cursor on the waypoints and plot the positions. In case you make a wrong plot, press [CLR] to erase the last plotted position. Save the route with [ENT] or exit the function with [MENU] to abandon the route.

☞ Do not use the exact position of buoys, markers etc. as waypoints and routepoints. The high accuracy of the system may result in a collision when sailing in the dark or navigating with an autopilot.

5 From active chart display with cursor on: To draw lines or to make a route is the same procedure, please see above.

6 From active chart display: With cursor on, plot target at cursor position and with cursor off, plot target at ship's position.
After plotting the target it will be saved in the memory, and you can edit the target later on, either via the menu (cf.section 9.7) or directly from the chart (cf.section 4.4.7).

7 From any display: Call up info window to start track. To change default values, see section 9.5.

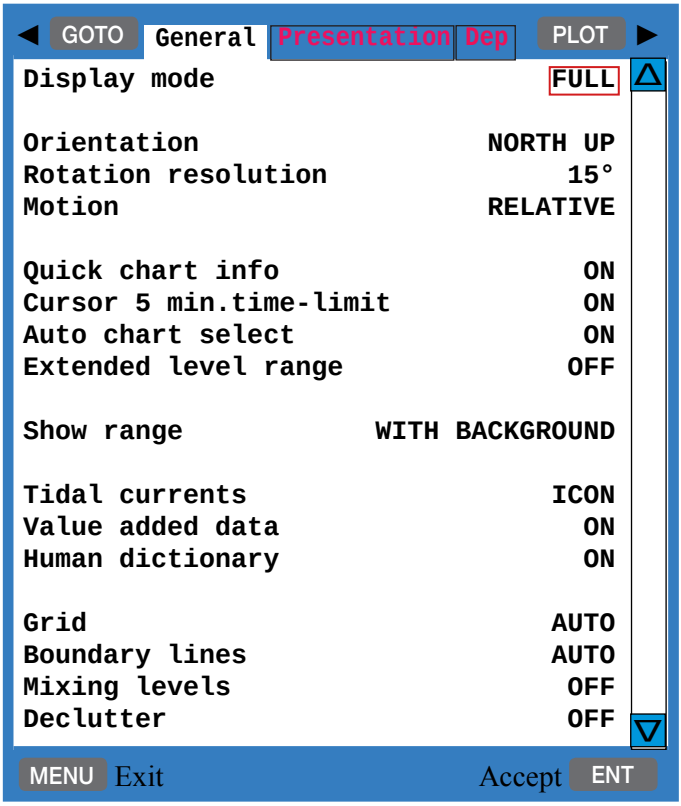
8 From any display: Call up info window to stop track.

9 From active echo display: Plot vertical marker (line) at the current ping in the echo display.

4.5 Chart setup

The settings are dedicated to the chart in the active window and does not affect the second chart. The C-MAP features available in the chart setup will depend on the type of C-card used i.e. NT MAX (all featues) or NT+ (refer to section 4.5.2 and Appendix C). See section 3.2.7 for chart settings related to the RadarChart overlay.

ADJ *Load chart setup related to active chart*



The tabs indicate which groups are available in each display mode e.g. the above example shows that in FULL display mode you have access to the groups in black: General, Areas and User data. The two groups in red i.e. Presentation and Depth are only adjustable in CUSTOM display mode. See further on in this chapter for more details.

+/- *Select display mode:* FULL, CUSTOM, SIMPLE, FISHING, LOW, GRID

PLOT *Go to the next group*

GOTO *Step back to the previous group*

Scroll up/down in the chart settings

+/- *Toggle between available settings*

ENT *Confirm changes and return to chart, or...*

MENU *Abandon Chart setup and return to chart without making any changes*

4.5.1 Display modes in the chart setup

There are 7 different display modes to choose from: FULL, CUSTOM (default), SIMPLE, FISHING, LOW, GRID, and a special OVERLAY mode, which only can be activated from the radar function - see section 3.2.7. When a group is shown in red or a function is shown in light grey it means that it is not available in the selected display mode. The default settings in the various display modes are:

Group: General - specification of chart display in general
The available functions are according to display example on previous page for all display modes and any change of the default settings will be applied in all display modes, except for GRID, which has three adjustable functions:

Motion = RELATIVE
Cursor 5 min. time-limit = ON
Show range = WITH BACKGROUND

Group: Presentation - specifies presentation of marine, land and chart topics
The default settings in this group are fixed in all display modes, except for *Custom where it is possible by the user to turn a feature ON (shown on the chart) or OFF (not shown on the chart), etc. - see next page.

C-MAP features are not available in GRID display mode.

C-MAP features	Full	*Custom	Simple	Fishing	Low
Marine:					
Names	ON	ON	ON	ON	OFF
Nav-Aids	INT	INT	INT	INT	INT
Lights	ON	ON	ON	ON	OFF
Light Sectors	ON	ON	OFF	OFF	OFF
Signals	ON	ON	ON	ON	OFF
Buoys	ON	ON	ON	ON	OFF
Attention Areas	ON	ON	ON	ON	OFF
Tides, currents	ON	ON	ON	OFF	OFF
Nature of seabed	ON	ON	OFF	ON	OFF
Ports	ON	ON	ON	OFF	OFF
Tracks, routes	ON	ON	OFF	OFF	OFF
Name tags	OFF	OFF	OFF	OFF	OFF
Land:					
Natural features rivers	ON	ON	ON	OFF	OFF
Natural features	ON	ON	OFF	OFF	OFF
Cultural features	ON	ON	OFF	OFF	OFF
Landmarks	ON	ON	ON	OFF	OFF
Traffic	ON	ON	OFF	OFF	OFF
Points of interest	ON	ON	OFF	OFF	OFF

Group: Depth - specifies the presentation of depth lines, levels, etc. on chart The default settings in this group are fixed in all display modes, except for *Custom where it is possible by the user to alter the features. The color indication for depth levels 1, 2 and 3 is determined by the color palette in the SETUP menu. C-MAP features are not available in GRID display mode.

C-MAP features	Full	*Custom	Simple	Fishing	Low
Soundings	ON	ON	ON	ON	OFF
Underwater objects	ON	ON	ON	ON	ON
Depth Lines	ON	ON	ON	ON	OFF
Depth Lines>	0000m	0000m	0000m	0000m	0000m
Depth Lines<	9999m	9999m	5m	9999m	5m
Depth Areas	ON	ON	ON	ON	OFF
Depth					
Level 1	0-002m	0-002m	0-002m	0-002m	0-002m
Level 2	2-009m	2-009m	2-009m	2-009m	2-009m
Level 3	9-MAX	9-MAX	9-MAX	9-MAX	9-MAX
Depth tags	OFF	OFF	OFF	OFF	OFF
Depth range					
Min	0000m	0000m	0000m	0000m	0000m
Max	9999m	9999m	9999m	9999m	9999m

Group: Areas - specifies the presentation of different areas on chart.
The default settings in this group are the same for all display modes and any change of the default settings will be applied in all display modes, except GRID, which do not include C-MAP features. The features can be changed from FILLED to CONTOUR:

C-MAP features	All display modes
Land areas	FILLED
Depth areas	FILLED
Caution areas	FILLED
Dredged areas	FILLED

Group: User data - user defined objects can be visible or invisible on chart
The default settings in this group are the same for all display modes and any change of the default settings will be applied in all display modes.

Chart features		Defaults and choice of settings
Waypoints		All the features in the user data level that are set as default to ON= shown on chart, can be changed to OFF= not shown on chart.
Non active waypoints	ON	
Waypoint names	ON	
Waypoint depths	ON	
Routes		Non active routes and tracks, all lines and all targets are default to: AS SELECTED= the choices made for a particular route etc via the menu e.g. MENU, 7, 2, ENT, ENT - Edit route, where 'Course line' can be set ON or OFF.
Non active routes	AS SELECTED	
Route names	ON	
Tracks		
Non active tracks	AS SELECTED	
Track names	ON	
Lines		'AS SELECTED' can also be changed to 'ALL ON'= shown on the chart, or 'ALL OFF'= not shown on the chart.
Lines	AS SELECTED	
Line names	ON	
Targets		
Targets	AS SELECTED	
Target names	ON	

4.5.2 Description of chart features

Auto chart select - When sailing with 'Auto chart select' ON and cursor turned off, the range will automatically change to match the chart which is available. But when set to OFF, then the selected range will remain, also when sailing 'out of the chart'.

Boundary lines - will indicate available C-MAP chart areas.

Caution areas - can be set to FILLED or CONTOUR.
FILLED= The caution areas will be filled with a preset color from C-MAP.
CONTOUR= The caution areas will be shown with a contour line only and the fill will be the same as the background/water color on the chart.

Cursor 5 min. time-limit - can be set ON or OFF. When set to ON, the chart cursor will automatically turn off if not used in a period of five minutes.

Declutter - when set to ON there will be no overlapping text on the chart e.g. Names, Spot soundings etc.

Depth: Level 1, 2 and 3 - are identified by different colors. The number of meters in the levels can be changed. The colors are preset in the Palette setup.

Depth areas - can be set ON or OFF= Not shown on chart.
FILLED - the depth areas will be filled with the color preset in the Palette setup.
CONTOUR - the depth areas will be marked by a contour line only, and the fill will be the same as the background/water color on the chart.

Depth lines - can be set ON or OFF= Not shown on chart.

Depth range (NT MAX only) - insert a minimum and maximum range to define the underwater area from where you want to see objects on the chart.

Depth tags (NT MAX only) - shows the depth on underwater objects. Can be set ON or OFF on the chart.

Dredged areas - can be set to FILLED or CONTOUR.
FILLED= The dredged areas will be filled with a preset color from C-MAP.
CONTOUR= The dredged areas will be shown with a contour line only, and the fill will be the same as the background/water color on the chart.

Extended level range - will enable changing range 3-4 steps within the same chart level after having selected the range via a numeric key.

Grid - the LAT/LON grid can be set to ON or AUTO
ON= The LAT/LON grid will be visible on the chart display all the time.
AUTO= The LAT/LON grid will appear on the chart display when there is no actual chart available in the selected scale.
The color of the grid is preset in the Palette setup.

Human dictionary - when set to ON, the shown information will be written in more clear and understandable text.

Land areas - can be set to FILLED or CONTOUR.
FILLED= The land areas will be filled with a preset color in the Palette setup.
CONTOUR= The land areas will be shown with a contour line only and the landfill will be the same as the background/water color on the chart.

Land settings - can all be set ON=Shown on chart or OFF=Not shown on chart.

Marine settings - can all be set ON or OFF, except for **Nav-Aids** which can be set to INTERNATIONAL, INT. SIMPLIFIED, US, US SIMPLIFIED or OFF.
Nav-Aids - include Lights, Light Sectors, Signals and Buoys.
INTERNATIONAL (Lights, Light Sectors, Signals, Buoys) - will present Nav-Aids in 'real life' shapes and colors for quick visual recognition (as per official INT1 standard paper chart presentation).
INT. SIMPLIFIED (Signals, Buoys) - the NavAids will be shown in generic symbols for minimum visual clutter on-screen.
US (Lights, Light Sectors, Signals, Buoys) - will present NavAids in simplified shapes and real colors (as generally found on NOAA paper charts).
US SIMPLIFIED (Signals, Buoys) - the NavAids will be shown in generic symbols for minimum visual clutter on-screen.
OFF - will shown no Nav-Aids on the chart.

Mixing levels - when set to ON, the number of blank chart areas will be reduced, as the C-MAP library will find the missing area in a different level to cover the blank area otherwise left on the screen. However, when using this feature, chart re-draw time will be increased a little.

Name tags - shows a name/number next to buoy and beacon icons on the chart. Can be set ON or OFF.

Orientation - can be set to NORTH UP, COURSE UP or NAV UP, and the mode can be RELATIVE or TRUE motion.
NORTH UP - the chart will always be presented as north up.
COURSE UP - the chart will automatically turn, so your actual course (COG) is up. If chart cursor is active it will stop the chart from rotating, press [CLR] to turn cursor off. If a compass is connected, the reference will automatically

change to heading (compass).
NAV UP - the chart will automatically turn, so your bearing to destination is up. If chart cursor is active it will stop the chart from rotating, press [CLR] to turn cursor off.
RELATIVE motion - the 'ship is positioned at the center of the screen and the chart will move.
TRUE motion - the 'ship' will move across the chart.

Points of interest - when set to ON, you can obtain information on special attractions. Place the cursor on the chart symbol to call up an info window and press [ENT] to call up information on the attraction.

Quick chart info - placing the chart cursor on a C-MAP object will activate a small info window with details on the object. Info window will automatically close after 10 seconds or when cursor is moved away.

Rotation resolution - can be set to adjust the chart for each 5, 10, 15, 20 or 25° changes in relation to present course or heading.

Show range - can be set to WITH BACKGROUND, ON or OFF:
WITH BACKGROUND - will add a small line to the chart display indicating that the length of the line equals a certain number of nautical miles/km - the indication is highlighted with a background color.
ON - same as above, but without background color.
OFF - indication is not shown on chart.

Soundings - can be set to ON or OFF.
ON - the information will be shown as selected i.e. in feet, fathoms or meters.
OFF - soundings are not shown on chart.

Tidal currents (NT MAX only) - can be set to ICON, ON, OFF:
ICON - will show icons (a diamond shape with the letter **c** in it). Place the cursor on the icon to call up an info window, then press [ENT] to call up tidal current information on the location.
ON - will indicate the speed and direction of the current by means of colored arrows, as shown below:

0 to 0.1 kn - Green
0.2 to 1.0 kn - Green
1.1 to 2.0 kn - Yellow
2.1 to 3.0 kn - Yellow
3.1 to 9.9 kn - Red

Traffic - when set to ON, the chart will indicate roads, railroads, etc.

Underwater objects - can be set ON or OFF.

Value added data (NT MAX only) - when set to ON, additional data on wrecks, cables and pipelines, sailing directions, bathymetric info, etc. will be available.

5. Echo menu

The ECHO menu and its related functions are only applicable with built-in echosounder module and connected transducer, except section 5.11 'Depth & temperature diagram' which applies to all models in the CX34/44/54 serie.

3 ECHO	
1 50kHz (or 38kHz CX44/54)*	
2 200kHz*	
3 Dual Frequency (CX44/54)*	
4 Depth & temperature diagram	- see section 5.11.
5 Custom screen 1	
6 Custom screen 2*	

*) available with built-in Echosounder function.

Low and high frequency echosounder display can be set up separately. The low frequency display will show deep water bottom contours, and the high frequency display will show the mid-water section with trawl targets or bait fish in a higher resolution.

The Dual Frequency display (CX44/54) will provide both the 50kHz and the 200kHz echo displays in one screen.

The two custom screens will present multiple window combinations (section 5.2), where one of the main echo displays i.e. 50kHz or 200kHz will be fixed in the left half of the screen. Adjustments can be made individually to both displays (section 5.7).

5.1 Echosounder operation

The echosounder function of the CX34/44/54 determines the distance between its transducer and underwater objects such as fish, lake bottom or sea bed. It does this by utilizing the fact that an ultrasonic wave transmitted through water travels at a nearly constant speed of 4800 feet (1500 meters) per second. When a sound wave strikes an underwater object such as fish or sea bottom, part of the sound wave is reflected back toward the source. Thus by calculating the time difference between the transmission of a sound wave and

the reception of the reflected sound wave, the depth to the object can be determined.

The entire process begins in the display unit. Transmitter power is sent to the transducer as a short pulse of electrical energy. The electrical signal produced by the transmitter is converted into an ultrasonic signal by the transducer and transmitted into the water. Any reflected signals from intervening objects (such as a fish school) are received by the transducer and converted back into an electrical signal. It is then amplified in the amplifier section, and finally, displayed on the screen.

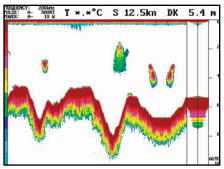
The picture displayed is made up of a series of vertical scan lines (pings), one for each transmission. Each line represents a 'snapshot' of what has occurred beneath the boat. The series of snapshots are accumulated side by side across the screen, and the resulting contours of the bottom and fish between the bottom and surface are displayed.

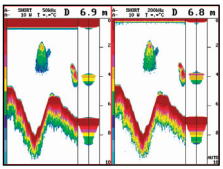
Selecting echosounder displays
The CX34/44/54 provides various types of echosounder displays: standard echogram, bottom expansion (zoom), VRM expansion, and shift mode. Each display has its special advantages. Select the appropriate setup for the echosounder display in the presentation "Setup" and "Echosounder setup" displays, considering current sea area and target fish.

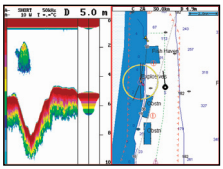
5.2 Shortcut to the pages in the echo-series

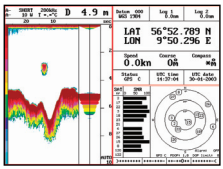
The ECHO function is one of the main functions in the CX34/44/54. Each page under the [ECHO] key will include a window representing the echo function. It is not possible to exchange main function displays with a new display. Refer to section 2.1, 2.1.1 and 2.1.2 for further information on the display and page system.

From any display:
ECHO Long press on the [ECHO] key will toggle between:


Standard


Dual Frequency (CX44/54)


Custom screen 1



Custom screen 2

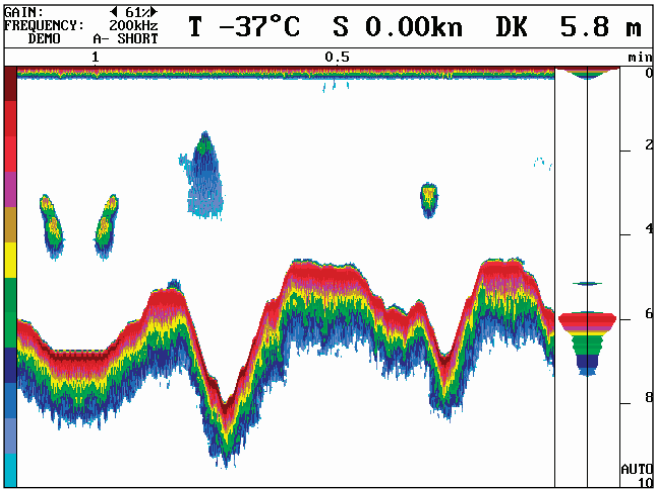
5.3 Standard echo display

This is the basic presentation mode (standard display) for observing fish schools and sea bed. Some surface noise may appear just below the transmission line.

To access one of the displays via the menu e.g.:

MENU
Call up the menu bar, and...

3,2
press [3] *and* [2] *to call up the Echo display for 200kHz in full screen*



Transmission line.
Time scale.

Depth range is adjustable with +/- keys or the Quick-range keys 1-9.
Press key 0 to return to Auto range.

The data field is preset to show: Gain level, Frequency, Transmit Pulse length **A- SHORT** (set to AUTO), Transmit Power **A- 10W** (set to AUTO) - see section 5.7.
Water temperature **T** in Celcius or Fahrenheit (in 1/10 degrees), water or SOG speed **S** in knots or kilometers/hour or miles/hour, actual depth ***DK** - units can be changed in Setup for units (MENU,8,1).

*) Actual depth i.e. **D**epth below **K**eel/Surface/Transducer - settings can be changed in Echosounder setup (MENU,8,ECHO).

1-9 *Select range in 9 steps*

+/- *Adjust range with the + and - keys*

0 *Activate Auto range*

Press cursor left/right to adjust gain

ADJ *Direct access to Setup display related to active echo display 50kHz or 200kHz* - (see section 5.7)

Use the cursor to go to the function you wish to change the value for

+/- *Toggle between available values*

ENT *Confirm changes, or...*

MENU *Abandon changes and exit Setup display*

5.4 Variable range marker

The VRM (Variable Range Marker) refers to a horizontal black line shown on the display screen. The user can measure the range to targets shown on the display screen by use of the VRM. The depth to the VRM can be seen in the top left side of the screen for a few seconds after the VRM line is moved.

From active echo display:

Activate the Variable Range Marker function, and...

Move the VRM up/down

+/- *Adjust the range by means of the +/- keys*

CLR *Turn VRM off again*

5.5 Echo quick menu

A number of echo features can easily be accessed from the Echo quick menu.

From active echo display:

ENT *Call up the Echo quick menu* with access to the following features:

Echo quick menu	
1	Change frequency
2	Hide A-scope
3	Standard echo display
4	Bottom lock display
5	Zoom display
6	Shift display
ECHO	Transmit power off
MENU	Exit

1 *Change frequency* will toggle between 38 (CX44/54), 50 or 200 kHz displays (Airmar transducers) to suit the task. 200 kHz is for general purpose and offers optimum discrimination and a narrow transmitter beam. 38/50 kHz is for searching in a wider area, determining bottom conditions and going the deepest.

2 *Activate/Hide A-scope* The amplitude scope at the right side of the echo display indicates the precise amplitude or strength of the last received ping (sounding), which often can be used for determining individual species of fish or hardness of the bottom.

3 *Standard echo display* Return to the basic presentation mode (standard display) from echo display with an added feature e.g. bottom expansion, VRM expansion, etc.

4 *Bottom lock display* The advanced bottom lock and expansion feature ensures a reliable depth readout and provides a compressed standard display in the upper half of the display. The bottom area can be magnified for better separation of echoes. The actual range of

the expansion window can be adjusted in the Setup display.

5 *Zoom display* This feature will provide an expanded view of the area near the *Variable Range Marker which will give a better separation of echoes. The actual range of the expansion window can be adjusted in the Setup display.
*) see section 5.4.

6 *Shift display* This feature can be applied when operating in deep waters and select the range for an expansion window. The expansion window can automatically follow a changing bottom or be set manually by the +/- keys.

ECHO *Transmit power off* Stop transmission in order to observe noise picked up by the transducer.

MENU *Abandon the Echo quick menu without making any changes*

5.6 Plot waypoint or event mark via PLOT menu

From active echo display:

PLOT *Call up the PLOT menu* with the following to choose from:

9 *Set vertical mark* will plot a vertical marker (line) at the current ping.

- or you can plot the position of a given echo on the chart:

3 *Insert waypoint* will activate a cursor on the echo display

Move cursor to the echo which position you wish to place as a waypoint

ENT *Press* [ENT] *to register the waypoint on the echo display*

A new info window will open where you can change the name of the waypoint, adjust the position if necessary, change symbol and color of the waypoint. When satisfied with the information in the info window:

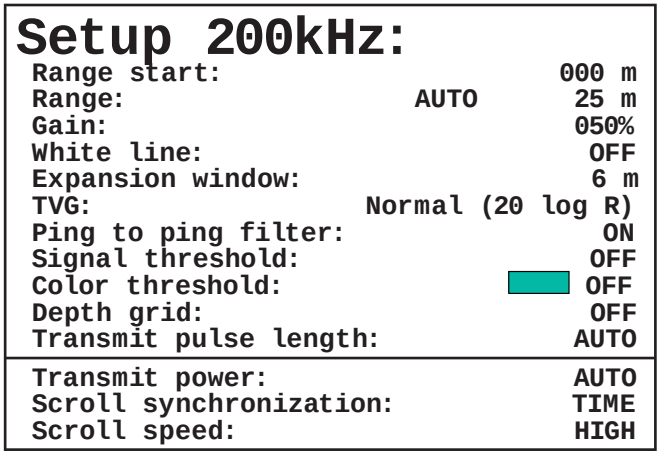
ENT *Press* [ENT] *to save waypoint*

5.7 Presentation setup

The general Echosounder setup e.g. Selecting transducer, Alarm settings, Demo mode etc. is placed in the SETUP menu (section 10.3).

The echo setup in this chapter are the most common settings for adjusting the presentation of the high or low frequency echo picture, and can be accessed by a single keystroke.

ADJ *Press* [ADJ] *from active echo display*



Use the cursor key to move cursor around in the display

0-9 *Key in new figures, or...*

+/- *Toggle between available values*

ENT *Confirm changes, or...*

MENU *Abandon changes and exit display*

Range start – allows the user to set the displayed depth range to begin at some point below the surface. For example, a 100 meter displayed range can be "phased" downwards, so that the screen shows a 100 meter section beginning at, say, 200 meters and going to 300 meters depth.

Range – refers to the distance shown from the top to the bottom of the display screen. Selecting **Auto range** will cause the CX34/44/54

to change the basic range setting(s) to keep the displayed bottom in the lower half of the display. For instance, as your boat moves into deeper waters, the system will automatically switch to a deeper range, always keeping the displayed bottom in the lower half of the display. **Manual range** allows the operator to set the range displayed on the screen.

Gain – is another way of saying "sensitivity", or possibly "volume". Increasing the gain setting of the CX34/44/54 will allow you to see smaller and deeper targets. If the gain is set too high, however, you will begin to see "noise" and unwanted targets. Generally speaking, you want to set the gain control just below the point that you begin to see speckles of "noise" between surface and the bottom on the screen.

White line – is a control which places a white/black line at the displayed sea floor and blanks out 4 pixels just below the line. The purpose of this is to help the user detect targets, such as fish, which are very close to the sea floor and whose echoes tend to merge with those of the sea floor itself.

Expansion window (zoom level) – can be selected in eight steps, ranging from 1 to 50 meters, or converted to feet or fathoms (refer to Setup for units, section 10.5). This function allows you to take a closer look at a particular section of the water underneath your boat. You can expand the view near the bottom (Bottom expansion) or near the Variable Range Marker (VRM expansion).

TVG – Time Varying Gain – is a control that allows the CX34/44/54 to make corrections for most of the losses and absorption that occurs as sound energy passes through sea water. There are three settings to choose from, Normal, Special and OFF.
The setting "Normal (20 log R) is for general fish finding at depths down to 50m (150') and it will also give a uniform bottom echo presentation at shallow, mid and deep water.
The setting "Special (40 log R) will adjust the TVG to show the same echo strength for a given size fish at varying depths.
The OFF position is used for net sounders. In OFF position the TVG is inactive which means that the sounder operates with a fixed gain between each transmitter pulse. Auto range is switched to manual.

Ping to ping filter – can be set to either on or off. With the filter "off", then each received echo will be reflected on the screen. Whereas with the filter "ON", the system will compare every two

echoes received and only reflect on the screen what is received from both echoes, which will give a more uncluttered recording.

Signal threshold – can be set to ON to eliminate the appearance of unwanted noise. The threshold level is automatic and the feature should be used with caution, as it may eliminate small fish and small unidentified objects on the screen.

Color threshold – the color threshold function allows the "weaker" targets and noise which may be shown on the display screen to be eliminated from the display. These targets are usually shown in the weaker target colors such as blues and greens. The Color threshold allows you to choose not to display the blues, or the blues and greens, etc. Doing this will leave only the stronger targets on the display screen.

Depth grid - enables a more precise reading of depth and target relations across the screen.

Transmit pulse length – can be set OFF to observe noise in the water (Auto range will switch to manual mode). Set to AUTO, the optimum setting will be applied according to the water depth. Or it can be set manually, if a specific pulse length is required:

SHORT	less than 10m deep water
MEDIUM	between 10 and 50 m deep water
LONG	more than 50m deep water
☞ *A long pulse will reach deeper but give less resolution.*	

Transmit power – should normally be left on AUTOmatic.
CX34 settings are: AUTO, 600W, 100W, 10W and OFF.
CX44/54 settings are: AUTO, 1000W, 500W, 100W, 10W and OFF.

Scroll synchronization – the screen can be updated on the basis of time or distance (when data from last ping appears on the display).

Scroll speed – is the ping rate and movement of the presentation of echoes on the screen, moving from right to left. It is adjustable (Low, Medium, High, Freeze), to allow the user to show a longer "history" on the display screen, if desired.

5.8 How the echosounder works

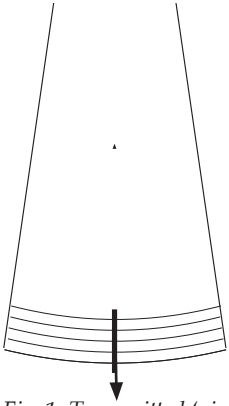


Fig. 1 Transmitted 'ping' from the transmitter/receiver.

When the CX34/44/54 is turned on, a transmitter begins to send electrical pulses to the transducer. The ceramic resonators in the transducer has a special property which enables it to change dimensions slightly when a varying voltage is applied.

The voltage is thus converted to mechanical vibrations (sound waves) which are then transmitted down through the water.
See Fig. 1.

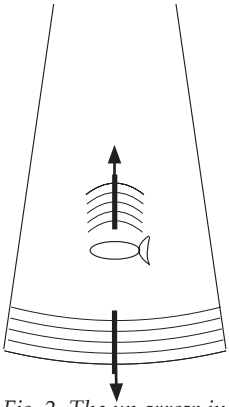


Fig. 2 The up arrow indicates: Echo returning to the receiver. The down arrow indicates: Transmitted pulse.

The sound waves move through the water until they encounter a change in density, such as a fish or the bottom. This causes the sound waves to 'echo' back up through the water. When the reflected sound waves (echoes) hit the transducer, the ceramic disk vibrates at the same frequency. This generates a varying voltage between the disk surfaces. This voltage goes back up through the cable to the receiver. The CX34/44/54 amplifies and processes the signals and presents them on the display screen.
See Fig. 2.

5.9 Transducer beamwidth

The transducer mounted to the hull of your vessel serves as both a ‘speaker’ when transmitting, and as a ‘microphone’ when the echosounder is receiving. Similar to the way a flashlight focuses light, most of the sound from your transducer is focused downwards with a smaller amount going out to the sides. The amount of focusing of the sound beam is expressed as a ‘beamwidth’.

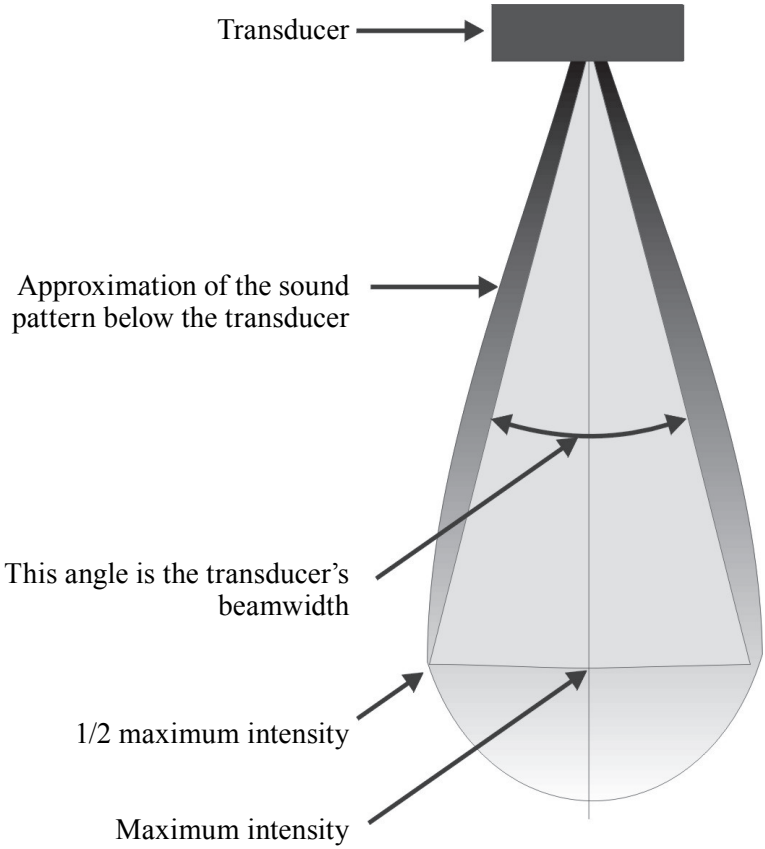

Transducer
Approximation of the sound pattern below the transducer
This angle is the transducer’s beamwidth
1/2 maximum intensity
Maximum intensity

Fig. 3 A representation of a transducer bemwidth.

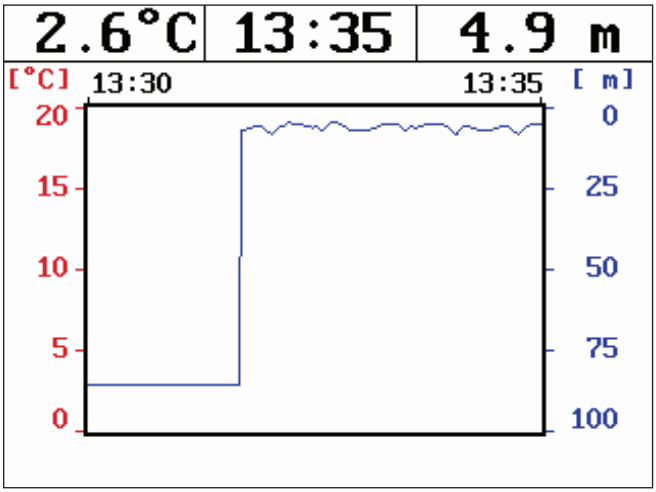
The center of the sound beam is the most intense, then as you move out towards the sides of the sound beam there is a point where the intensity of the sound is half what it was in the center. The distance moved is the ‘beamwidth’. See Fig. 3.

5.10 Effects of the vessel's speed

The presentation of fish on the CX34/44/54 depends directly on the vessel's speed, as well as on the depth of the fish. When the vessel is at rest, the echo traces will appear stretched and flattened. As the vessel's speed becomes greater, the echo traces will become shorter and more arched. The reason for this change in appearance is that as the vessel speed increases, fewer number of sound 'pings' strike each fish. A low vessel speed will provide the most accurate information of where fish are loacted.

5.11 Depth & temperature diagram

MENU *Call up the menu bar, and...*
3,4 *activate Depth & temperature diagram*

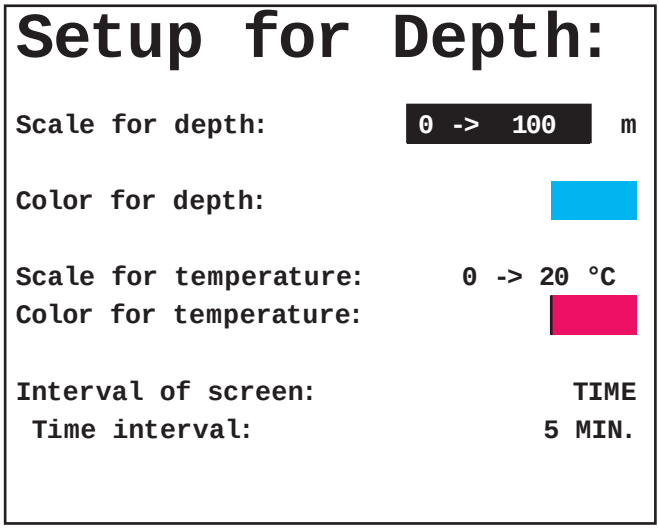


Present water temperature and depth.

Depth over time or distance.

Temperature over time or distance.

ADJ *Call Setup for Depth*
- see display example next page.



Go to the function you wish to change

0-9 +/- *Key in new figures, or... change settings*

ENT *Confirm changes*

Scale for depth - there are six depth scales to choose from, ranging from 0 -> 10m to 0 -> 3000m. Toggle between values with +/- keys.

Color - for depth and temperature can be changed. Toggle between available colors by means of the +/- keys.

Scale for temperature - can be set to 0 -> 10°, 0 -> 20°, 0 -> 30°, 10 -> 20°, and -10 -> 10°.

Interval of screen - the interval for updating of screen can be related to TIME or DISTANCE.
TIME interval can be set in 6 intervals from 5 minutes to 3 hours (+ freeze) for refreshing of the screen.
DISTANCE can be set in 7 intervals, ranging from 0.5nm to 90nm in order to adjust to the speed of the ship, and you can freeze the reading.

6. Pilot menu

4 PILOT	
1 Highway	- see section 6.2 & 6.2.1
2 Position	- see section 6.3
3 Dual Speed	- see section 6.4
4 ETA & AVN	- see section 6.5
5 Trim & Highway	- see section 6.6
6 Set & Drift	- see section 6.7
7 Custom screen 1	- see section 6.8
8 Custom screen 2	- see section 6.8 + chapter 7.

See also section 6.10 Anchor guard, section 6.11 MOB navigation and 6.9 Navigation examples.

All functions in the Pilot menu are relevant information to use for navigation. The two custom screens will present multiple window combinations (section 6.1), where the window in the top left quarter of the screen will present a fixed display from the pilot menu.

MENU
4,1

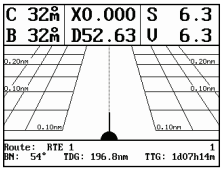
To access one of the displays via the menu e.g.:
Call up the menu bar, and...
press [4] *and* [1] *to call up the Highway display in full screen*

6.1 Shortcut to the pages in the pilot-series

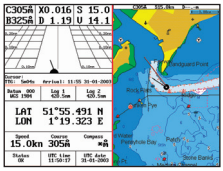
The PILOT function is one of the main functions in the CX34/44/54. Each page under the [PILOT] key will include a window representing the pilot function. It is not possible to exchange main function displays with a new display. Refer to section 2.1, 2.1.1 and 2.1.2 for further information on the display and page system.

PILOT

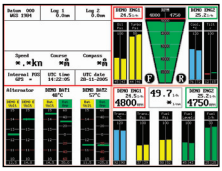
Press the [PILOT] key from any display to call up a display in the pilot-series, and:
Long press on the [PILOT] key will toggle between (default):



Highway



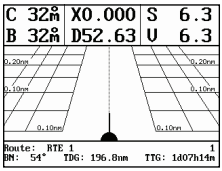
Custom screen 1



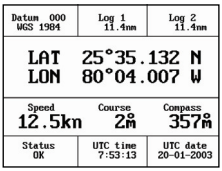
Custom screen 2

PILOT

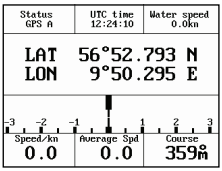
From one of the pilot displays i.e. full screen and active window in the top left quarter:
Short press on the [PILOT] key will toggle between:



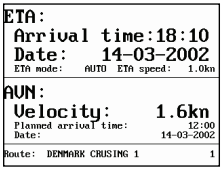
Highway



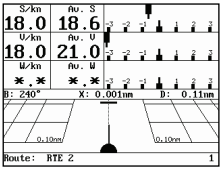
Position



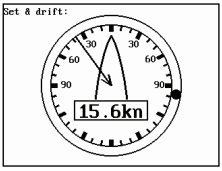
Dual Speed



ETA & AVN



Trim & Highway



Set & Drift

The sequence of the six displays under the [PILOT] key is available when a navigation mode is active. If no navigation mode is active, then the ETA & AVN and the Trim & Highway displays will not be present in the sequence.

6.2 Highway display and Navigation setup

MENU *Call up the menu bar, and...*
4,1 *load Highway display*

When there is no navigation mode active, you will receive the legend: NAVIGATION IS OFF.

Before starting out in one of the navigation modes, it may be a good idea to check out the Navigation setup display and see if the default settings will suit your need.

ADJ *Load Navigation setup*

```
Navigation setup:

 Anchor alarm distance:          00.50nm
 WP circle alarm:          00.10nm  OFF
 WP and cursor navigation:
  XTE alarm:               00.10nm   ON
  Navigation mode:           RHUMBLINE
 Route navigation:
  XTE alarm:                        OFF
  Auto waypoint shift:       WP-circle
 Track navigation:
  XTE alarm:               00.10nm  OFF
  Auto trackpoint shift:     WP-circle
  Navigation mode:           RHUMBLINE
```

+/- *Toggle between available values, or...*
0-9 *key in a new alarm limit*

ENT *Confirm entry*

Anchor alarm distance - When setting anchor, check/change the preset alarm distance, etc., so you will be warned in case you drift too far from the anchored position. The alarm distance can be set to anywhere between 0.01 and 9.99nm. See also section 6.10 Anchor guard. The alarm will automatically reset once you are inside the limits again.

WP circle alarm - forms a circle around each waypoint, and the alarm distance can be set to anywhere between 0.01 and 9.99nm.

The waypoint alarm will be activated when you reach the circle or the perpendicular line - **WP line alarm** - crossing through the waypoint. When "Auto waypoint shift" is set to "WP-circle" it will override the "WP circle alarm" function.

XTE alarm - forms a corridor along the ideal track. When crossing one of the boundaries the XTE alarm will be activated.

The **alarm** will automatically reset once you are inside the limits again. The alarm distance can be set to anywhere between 0.01 and 9.99nm.

☞ In Route navigation the XTE alarm value can be specified for each route leg - see section 9.2.

Navigation mode - RHUMBLINE navigation is used for shorter distances, and GREAT CIRCLE for long trips, especially when crossing at high latitudes. COMPOSITE navigation is used when all the legs in a route are not set to the same navigation mode.

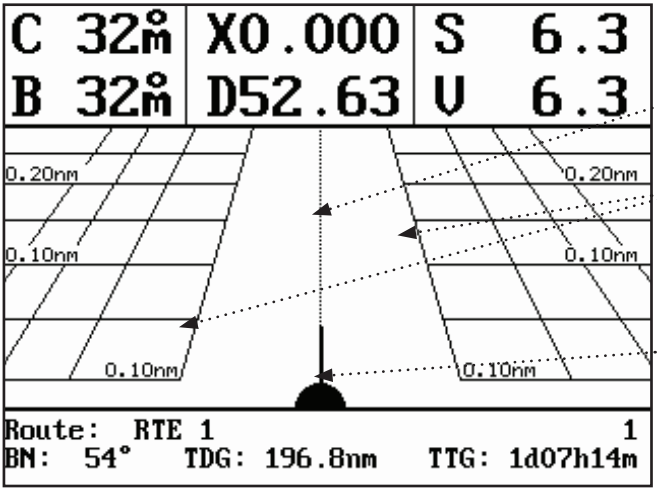
Auto waypoint shift - can be set to WP-circle, WP-line or OFF.
When set to WP-circle, the system will change to the next waypoint in the route after passing the circle line (border).
When set to WP-line, the system will change to next waypoint in the route after passing the waypoint line (border).
When "Auto waypoint shift" is set to WP-circle, then the alarm function at the waypoint's circle will not be activated.

6.2.1 Highway display when navigation mode is active

MENU
4,1

Call up the menu bar, and...
load Highway display

With navigation mode active, the highway display will provide a graphical steering display:



Intended track between two waypoints.

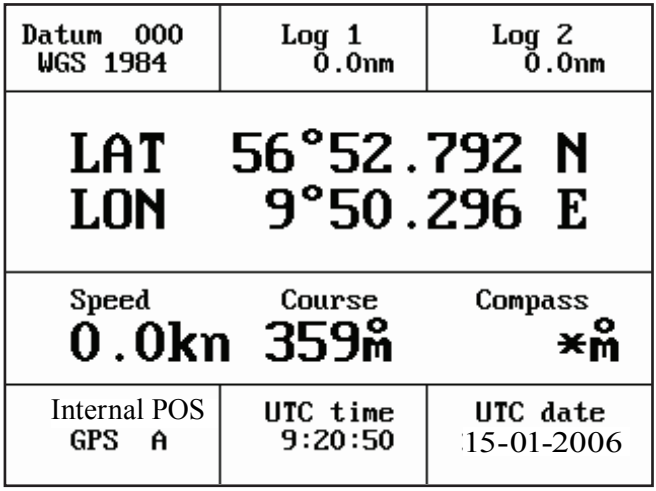
XTE alarm lines - refer to sec.6.2 for alarm setup.

Ship's position and course in relation to intended track.

C: Course over ground
X: XTE - Cross-track-error
S: Speed over ground
B: Bearing to approaching point
D: Distance to approaching point
V: Speed towards point
Route: Name/number of active route and aproaching routepoint
BN: Bearing to next point
TDG: Total distance to go to end of route
TTG: Total time to go to end of route

6.3 Position display

MENU *Call up the menu bar, and...*
4,2 *load the Position display*



Datum currently selected.

Trip log 1 and 2.

Position with three decimals in minutes.

Speed over ground.

Course, magnetic or true.

Depth or Compass from external sensor.

UTC or local time and date - Time and date in UTC - Universal Time Coordinates - is equal to standard time in London (GMT). UTC is not affected by the local summertime adjustments.

Position update - if, for some reason, there is no position update from GPS or external sensor, the displayed position will start to flash and an alarm will be activated to alert the operator. Reset the 'Position missing' alarm by [CLR]. The alarm can be set ON/OFF - see section 8.5. The displayed position will stop flashing once normal position update is resumed.

Internal POS - indicates the source of position data i.e. Internal, External or DeadReckoning.

GPS A - Status indicator for reception of satellites:
a (A)= good, b (B)= acceptable, c (C)= fair, or *= no update - see also "Status indicator and accuracy" below.

With built-in or connected DGPS receiver:
dGPS= differential data received.
DGPS= differential data received and used for corrections.
SDGPS= satellite differential data received and used for corrections.

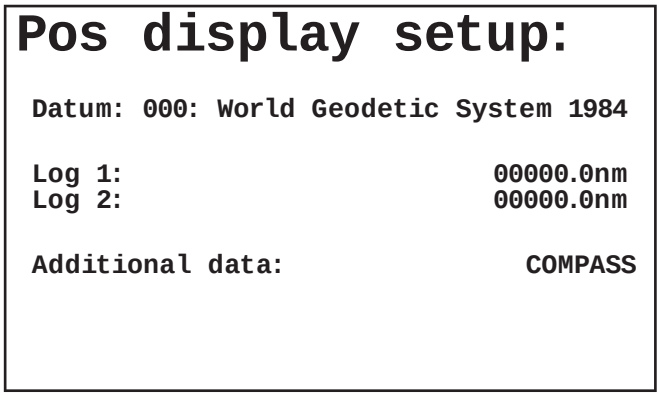
Status indicator and accuracy
Small letters (a,b,c,) indicate that SA is active, and the position accuracy is expected to be better than 100 meters in 95% of the time. Capital letters indicate that SA is OFF, and the position accuracy is then expected to be 15 meters or better in 95% of the time.
dGPS indicates that differential data is received, either via built-in differential receiver or from external receiver.
DGPS or SDGPS indicates that the position is corrected by the differential data. The accuracy will typically be 2-5 meters for DGPS and 3-7 meters for SDGPS.

In order to utilize the high accuracy of the GPS system, it is necessary to align the lat/long calculations to the paper charts you are using. Refer to Position display setup below.

☞ When using C-MAP electronic charts, the datum will be aligned automatically.

Position display setup
The general Position setup e.g. Display position as: LAT/LON, Decca or Loran C, etc. is placed in the SETUP menu (section 10.4).

ADJ From position display, press [ADJ] to load Position display setup:



Go to the function you wish to change

CLR *Reset log*

0-9 *Key in new values, or...*
+/- *Toggle between available values*

ENT *Confirm editing and return to the Position display*

Datum - is preset to WGS 1984 (World Geodetic System 1984), but can be changed to any of the 118 datums listed in Appendix B e.g. to match old paper charts or trackplotter data from RS2500/RS4000 (datum #002 European 1950).
The position in the position display and NMEA output (GLL+GL2) will refer to the selected datum. To select a new datum: place the cursor next to "Datum" and key in a new number or go two spaces to the right (00**0**) and leaf through the datum list with +/-.
☞ The datum in the chart display is fixed i.e. WGS84.

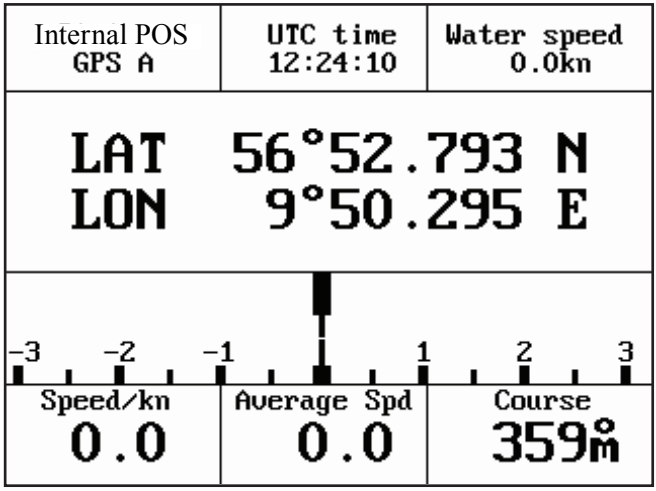
Log - reset log or insert alternative start figure by altering the value in the "Log 1" and/or "Log 2" line. Press [CLR] to reset the figure, and press the numeric keys 0-9 to alter the figure.

Additional data - can be set to COMPASS, DEPTH or ANT. HEIGHT.
COMPASS will show heading from connected sensor.
DEPTH will be shown from built-in echosounder or from connected depth instrument.
ANT. HEIGHT will indicate the actual antenna altitude (height above sea level).

6.4 Dual speed display (trawling speed display)

The analogue differential speed indicator will show how much the present speed varies from the average speed.
If the difference exceeds +/- 3 knots (or km/h or miles/h), an arrow will appear which will be pointing out of the scale.

MENU *Call up the menu bar, and...*
4,3 *load Dual Speed display*



Water speed readout from connected log transducer.

Position with three decimals in minutes.
Analogue differential speed indicator (scale).
Dynamic speed with short filtering time is reacting quickly to changes, but is also more unsteady.
Average speed with long filtering time gives a very stable reading.
Course over ground, magnetic (m) or true (°).

How to reset dual speed:

ADJ *Open for change*

ENT *Reset dual speed, or...*

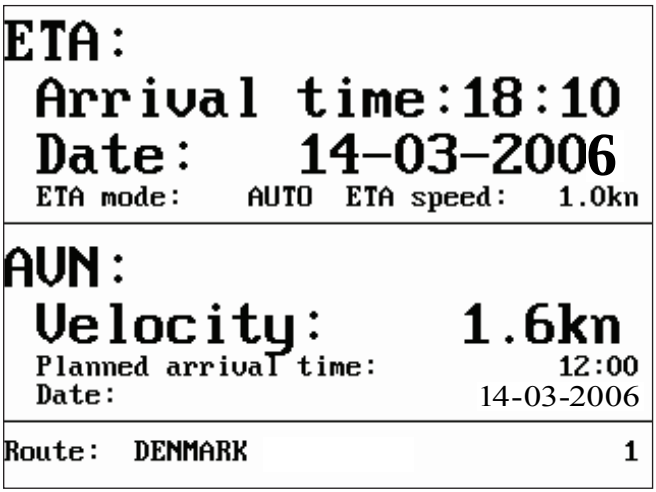
MENU *exit function without making any changes*

6.5 ETA & AVN display

MENU *Call up the menu bar, and...*

4,4 *load the ETA & AVN display*

-to receive any data will require that navigation mode is active.



ETA - Estimated Time of Arrival - refers to the inserted local time, and can be calculated to any point used for navigation.

AVN - Approximate Velocity Necessary - is automatically calculated in knots after you key in the planned arrival time and date.

In route navigation the approaching point and present speed over ground (AUTO) is automatically used for the calculation.
You can change to any waypoint in the route and also insert an alternative ETA speed (MANUAL).

ADJ *Open for change* - in route navigation the approaching point is automatically suggested and present speed is used for calculation.

If required - go to, and...

0-9 *Insert alternative routepoint* - only in Route navigation.

Go to ETA mode, and...

+/- *Select AUTO or MANUAL*

Go to AVN, and...

0-9 *Insert time and date*

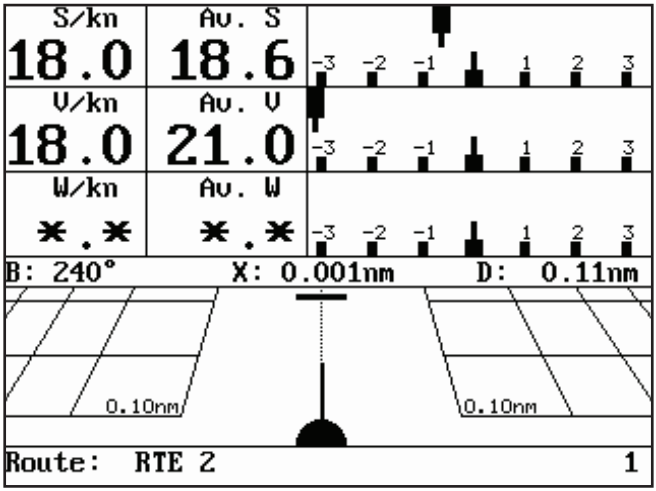
ENT *Confirm entry*

6.6 Trim & Highway display

☞ Some of the readings rely on data from external log and compass.

The Trim & Highway display will provide information on actual and mean speed, velocity and water speed - see also section 6.7 Set & Drift display.

MENU *Call up the menu bar, and...*
4,5 *load the Trim & Highway display*



B: Bearing.

X: XTE Cross-track-error.

D: Distance to point.

ADJ *Open for change*

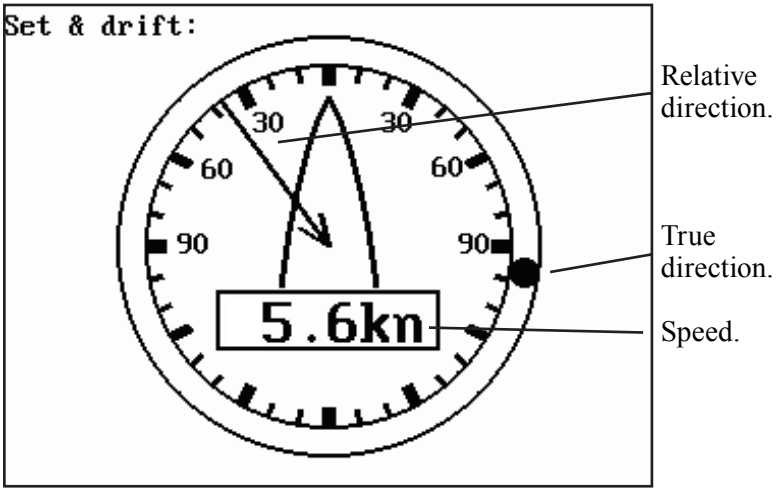
ENT *Reset mean speed indication in display*

6.7 Set & Drift display

☞ The readings rely on data from external log and compass.

MENU
4,6

Call up the menu bar, and...
load the Set & Drift display

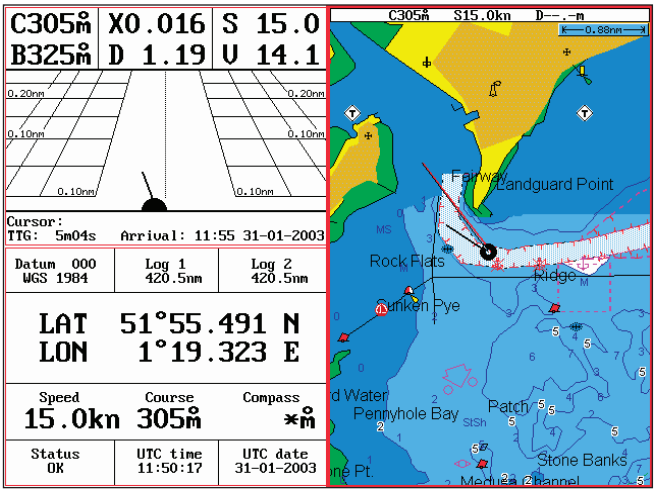


The Set & Drift display will show how fast the current is moving in knots; in what direction (true) it is moving and what direction in relation to the vessel (relative).

☞ To obtain information on actual and mean speed, velocity and water speed - see the Trim & Highway display in section 6.6.

6.8 Pilot custom screens

The two custom screens in the pilot menu consist of multiple window combinations e.g.:



The displays presented in the example above are the default displays for Custom screen 1 under the PILOT menu (Custom screen 2, see section 7. Engine menu).

Top left quarter window shows the Highway display, which can be exchanged with a different display from the pilot menu, either by single press on the [PILOT] key which will toggle through all the displays available from the pilot menu, or via the menu.

Bottom left quarter window shows the Position display, which can be exchanged with any display that will fit into a quarter window.

Right half screen shows the Chart display, which can be exchanged with a different one in same size window, or you can change the window combination from half to two quarter windows.

These custom screens can actually have several displays presented from the pilot menu. However, when the top left window is active and you toggle through the available displays from the pilot menu, the sequence will skip the displays already presented on the screen, as they can not appear twice on the same screen.

☞ See section 2.1.2 how you go about changing the displays.

6.9 Navigation examples

6.9.1 Chart/cursor navigation. 6.9.2 Waypoint navigation.
6.9.3 Route navigation. 6.9.4 Track navigation.

Relevant for all navigation modes are:

- the highway display with graphical steering - section 6.2.1.

- the ETA & AVN display with Estimated Time of Arrival and Approximate Velocity Necessary to reach a given point at a specific time - section 6.5.

- the *Trim & Highway display with information on actual and mean speed over ground, velocity (VMG) and water speed - section 6.6.

- the *Set & Drift display with indication of how fast the current is moving in knots, in what direction (true) it is moving and what direction in relation to the vessel (relative) - see section 6.7.

* These readings rely on data from external log and compass.

☞ With the [PILOT] key you can toggle between all the displays in the pilot-serie - see section 6.1 Shortcut to the pages in the pilot-serie.

6.9.1 Cursor navigation

Cursor navigation is the easiest and most straightforward way of navigation - point and go!

CHART *Shortcut to chart display*

Press the cursor key to activate the cursor, then move the cursor to your destination

GOTO *Call up the GOTO menu*
1 *Select Cursor navigation mode*

A course line will now be drawn from actual position (ship's position) to destination point (cursor's position).

Next destination: While on the way, you can easily *move the cursor to the next destination*, and when ready to change navigation leg...

GOTO *Call up the GOTO menu*

2 *Restart to approaching point*
- a new course line will be drawn from ship's position to destination.

To turn NAV mode off again: Press [GOTO], [3].

6.9.2 Waypoint navigation

To start Waypoint navigation will require that at least one waypoint is stored in the memory. Refer to section 4.4.9 PLOT menu.

CHART *Shortcut to chart display*

Place cursor on destination waypoint

GOTO *Call up the GOTO menu, and...*

2 *Select Waypoint navigation mode*

This will activate the pop-up window "Navigate to WP" - and if the highlighted waypoint is the point you wish to sail to, then just press [ENT] to start navigation.

However, if you wish to sail to a different waypoint:

+/- *Scroll up/down in the waypoint list, or...*

0-9 *Key in the number/name of the waypoint you wish to sail to*

ENT *Start navigation*

A course line will now be drawn from ship's position to destination waypoint.

To turn NAV mode off again: Press [GOTO], [3].

6.9.3 Route navigation

To start Route navigation will require that at least one route is stored in the memory. Refer to section 4.4.9 PLOT menu.

There are two ways to start Route navigation:

• From the chart:

Place cursor on the routepoint you wish to start your navigation from

GOTO *Call up the GOTO menu, and...*

3 *Select Route navigation mode*

This will activate the pop-up window “Navigate in route” with the selected routepoint as first destination point. Check if any of the current settings need to be changed e.g. forward or reverse direction in route.

ENT *Start navigation*

• From the chart, without first placing cursor on a routepoint:

GOTO *Call up the GOTO menu, and...*

3 *Select Route navigation mode*

This will activate the pop-up window “Navigate in route” from where you can choose which route you wish to select for navigation:

+/- *Scroll up/down in the route list until the correct route number / name appears*

Use the cursor to move around in the window if anything needs to be changed - such as Direction in route, etc.

0-9 *Key in the number of the first routepoint you wish to sail to*

ENT *Start navigation*

A course line will now be drawn from ship’s position to the first

routepoint.

GOTO Pressing [GOTO] from chart display during navigation will activate an INFO window with the following functions to choose from:

1. Advance (to next routepoint)
2. Restart to approaching point (in case you have drifted off course)
3. Turn NAV OFF

6.9.4 Track navigation

A track is created by a series of trackpoints connected by track lines. Using a track for navigation is somewhat like navigating in a route with many waypoints.

☞ To start Track navigation will require that at least one track is stored in the memory. Tracks which are not yet completed can not be used for navigation. Refer to section 9.5 Start / Stop track.

There are two ways to start Track navigation:

• From the chart:

Place cursor on the track at the point where you wish to start your navigation from

GOTO *Call up the GOTO menu, and...*

4 *Select Track navigation mode*

This will activate the pop-up window “Navigate in track” with the selected trackpoint as first destination point. Check if any of the current settings need to be changed.

ENT *Start navigation*

• From the chart, without first placing cursor on a track:

GOTO *Call up the GOTO menu, and...*

4 *Select Track navigation mode*

This will activate the pop-up window “Navigate in track” from where you can choose which track you wish to select for navigation:

+/- *Scroll up/down in the track list until the correct track number / name appears*

Use the cursor to move around in the window if anything needs to be changed - such as Direction in track, etc.

0-9 *Key in the number of the first trackpoint you wish to sail to*

ENT *Start navigation*

A course line will now be drawn from ship’s position to the first point of destination.

GOTO Pressing [GOTO] from chart display during navigation will activate an INFO window with the following functions to choose from:

1. Advance (to next trackpoint)
2. Restart to approaching point (in case you have drifted off course)
3. Turn NAV OFF

6.10 Anchor guard

GOTO
5
Call up the GOTO menu, and...
activate the anchor guard function
-the chart display will provide an impression of the vessel's position in relation to the alarm circle.

To check/change the preset alarm distance:
MENU
Call up the menu bar, and...
4,1
load the highway display

ADJ
Enter the navigation setup display

0-9
Key in a new value with numeric keys

ENT
Confirm the change

To turn Anchor guard off again:

GOTO
Call up the GOTO menu, and...
3
turn anchor guard off

6.11 MOB alarm and navigation

The MOB - Man overboard - alarm and display will be activated if you press the [MOB] key on the CX34/44/54 keypad and hold it depressed for two seconds, or activate an external MOB switch (hold five seconds) and then press the [ENT] key to start MOB navigation. The MOB display will provide all relevant data for an efficient rescue operation - refer to details on page III.

To turn the MOB function off again:
GOTO
Call up the GOTO menu, and...
3
turn the MOB function off

To check the last activated MOB position:
MENU
Call up the menu bar, and...
7,7
select MOB data

7. Engine menu

5 ENG	
1 Engine status	- see section 7.1
2 Fuel and transmission	- see section 7.2
3 Battery status	- see section 7.3
4 2nd Engine status	- see section 7.4
5 2nd Fuel and transmission	- see section 7.4
6 2nd Battery status	- see section 7.4

This graphical engine monitoring system is available for engines outputting data via NMEA2000® or an appropriate interface device supporting NMEA2000®. Depending on the engine system and interface, some data may not be transmitted on the databus. If not readily available, please contact the engine manufacturer or your local Simrad dealer.

The CX NavStation is capable of receiving and presenting various engine data in either full screen or split screen with two or all three data displays on same screen. The menu points 4, 5 and 6 are a second set of displays, which only will be visible if the system detected more than two engines on board.

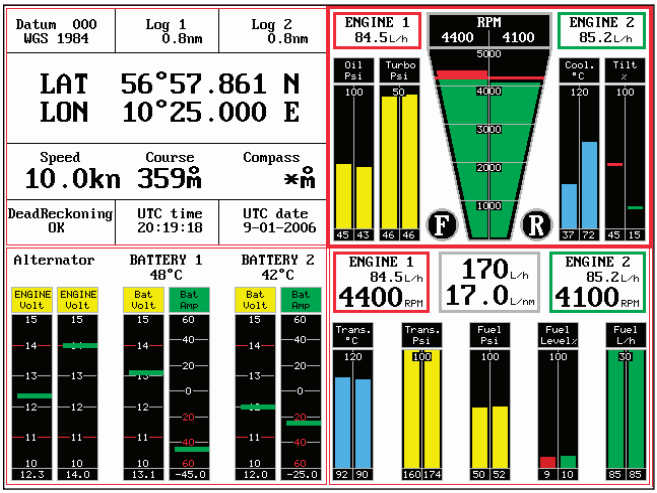
For dual engines, the system provides 'dual bar analog instruments' to give a precise overview of the rpm synchronization and to make direct comparison of data between the two engines.

The displays can be accessed one at a time via the Engine menu or all three displays at once by pressing:

MENU
4,8

Call up the menu bar, and...
press [4] *and* [8] *to call up a custom made screen presenting the position display and all three engine displays*

This custom made screen is from the pilot menu. Refer to section 6.8 Pilot custom screens, where you also can read about how to exchange the engine monitoring displays with other displays more relevant in case you do not have engines on board which are capable of outputting the required data.



The engine monitoring system provides analog graphical gauges and digital (numerical readings) data for up to four engines - see display examples further on in this chapter.

General settings

SimNet will auto detect the engines at start-up and will automatically set up the parameters in default mode. Before using the engine monitor system, you may want to edit the setup to customize the read-out. The top line identifies the engine/battery, the default is ENGINE 1 to 4 or BATTERY 1 to 4. Insert the correct name for the engine/battery in the Interface setup:

MENU
8,2

Call up the menu bar, and...
load the Interface setup

PLOT

Use the [PLOT] *key to go to the Engine tab*

Go to the name you wish to change,
- refer to section 2.6 Naming of routes, points etc.

ENT

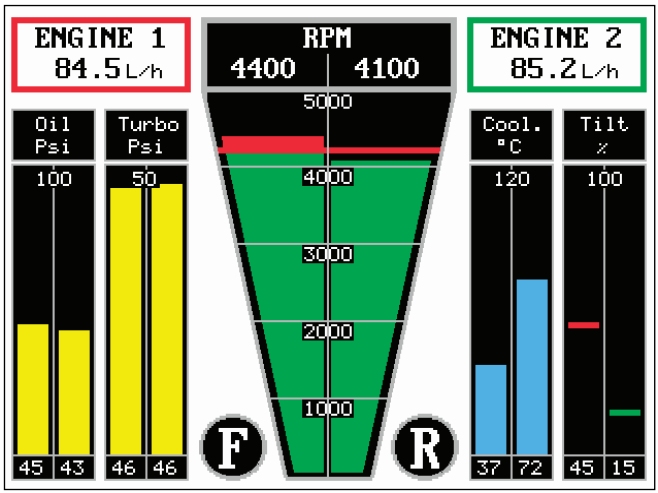
Confirm entry and exit

☞ To change the measuring units, refer to ‘Setup for units’ in section 10.5.

7.1 Engine status

MENU
5,1

Call up the menu bar, and...
load the Engine status display



Forward Reverse (N = Neutral)

The numbers at the bottom represents Engine 1 to the left and Engine 2 to the right in each column.

The Engine status display will provide data from 1 or 2 engines. If there are more than 2 engines on board (and connected to the system), a second Engine status display is available by pressing: [MENU], [5], [4].

The default ranges in the Engine status display can be viewed and changed as described below, except for **Tilt**, which is read-only information of the exact tilt of the outboard engine in percentage, or of the Stern drive. No range or limitation can be entered.

To change the default settings:

ADJ

Load Engine status setup
- see display example next page.

Left engine source - use +/- to toggle between connected engines.

Right engine source - use +/- to toggle between connected engines.

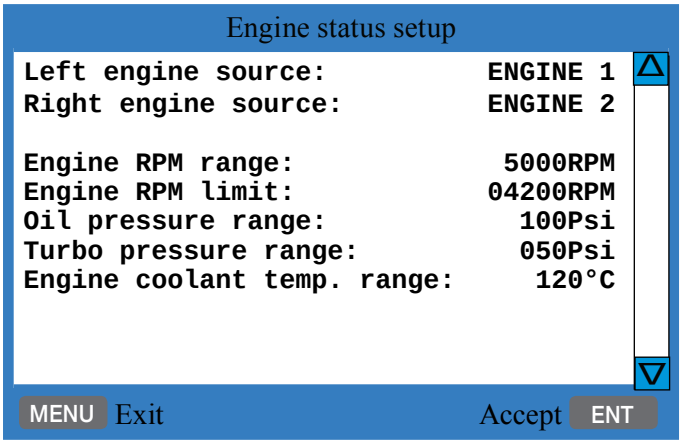
Engine RPM range, default is 5000 RPM. Selectable in steps from 2500 to 12500 by means of the +/- keys.

Engine RPM limit, default is 4200 RPM. To control the limit manually, you can insert a new limit by means of the numerical keys. When the limit is exceeded, the green fill color will turn red.

Oil pressure range, default is 100 Psi. Use numerical keys to enter new range. Can be shown in Psi (10-125 Psi) or Pascal (69-862 kPa).

Turbo pressure range, default is 50 Psi. Use numerical keys to enter new range. Can be shown in Psi (10-125 Psi) or Pascal (69-862 kPa).

Engine coolant temperature range, default is 120 degrees Celcius. Use numerical keys to enter new range. Can be shown in Celcius (40°C to 200°C) or Fahrenheit (104°F to 392°F).

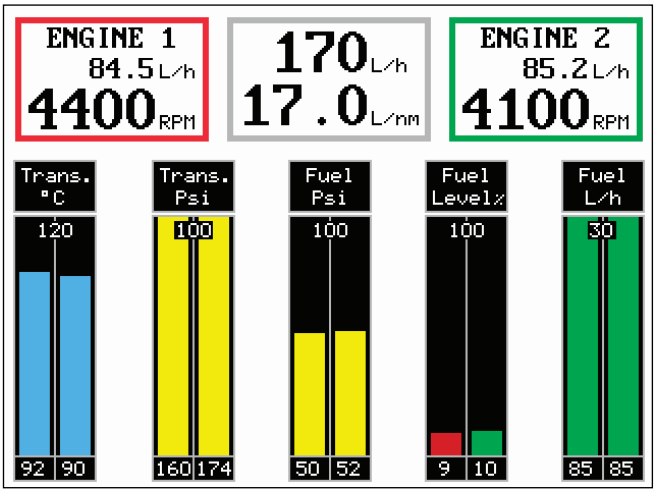


ENT *Confirm entry or exit with* [MENU] *without making any changes*

7.2 Fuel and transmission

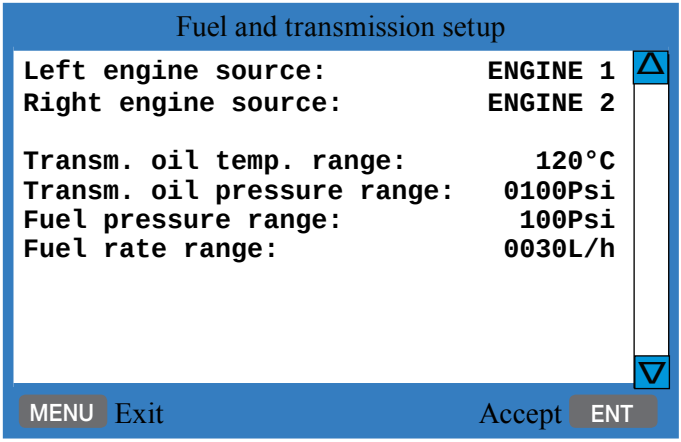
The level of fuel is indicated in a percentage of the maximum value, depending on the shape of the fuel tank and the level sensor. This level can either be 'level above tank bottom' or 'remaining volume in tank'. The fill color will be red when reaching < 10 %.

MENU *Call up the menu bar, and...*
5,2 *load the Fuel and transmission display*
- see display example next page.



In the top part of this display you have read-outs for Engine 1 to the left and Engine 2 to the right and a total for both in the middle. The second line in the middle i.e. '17.0 L/nm' - liter per nautical mile, is calculated by the NavStation. The read-out can be presented in L/nm, L/km, L/mi, G/nm, G/km, G/mi. The unit can be selected in [MENU], [8], [1], see section 10.5. The numbers at the bottom represents Engine 1 to the left and Engine 2 to the right in each column.

To change the default settings:
ADJ *Load Fuel and transmission setup*


Fuel and transmission setup
Left engine source: ENGINE 1
Right engine source: ENGINE 2
Transm. oil temp. range: 120°C
Transm. oil pressure range: 0100Psi
Fuel pressure range: 100Psi
Fuel rate range: 0030L/h
MENU Exit
Accept ENT

Left engine source - use +/- to toggle between connected engines.

Right engine source - use +/- to toggle between connected engines.

Transmission oil temperature range, default is 120 degrees Celcius. Use numerical keys to enter new range. Can be shown in Celcius (50°C to 300°C) or Fahrenheit (122°F to 572°F).

Transmission oil pressure range, default is 100 Psi. Use numerical keys to enter new range. Can be shown in Psi (10-500 Psi) or Pascal (69-3447 kPa).

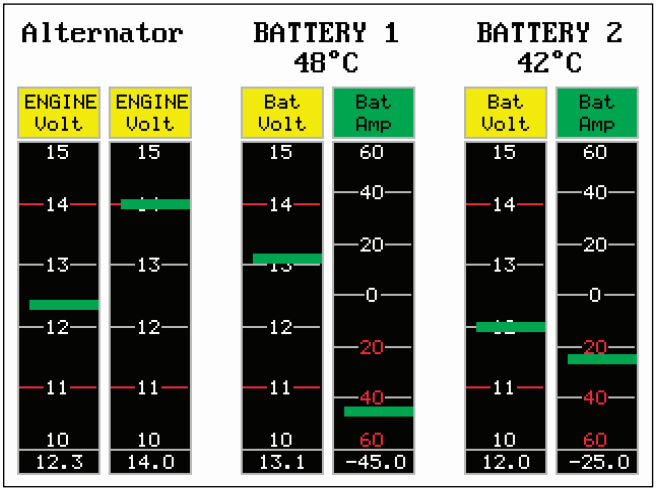
Fuel pressure range, default is 100 Psi. Use numerical keys to enter new range. Can be shown in Psi (10-125 Psi) or Pascal (69-862 kPa).

Fuel rate range, default is 0030 liter per hour. Use numerical keys to enter new range. Can be shown in liter per hour (1-1000 L/h) or gallon per hour (1-264 G/h).

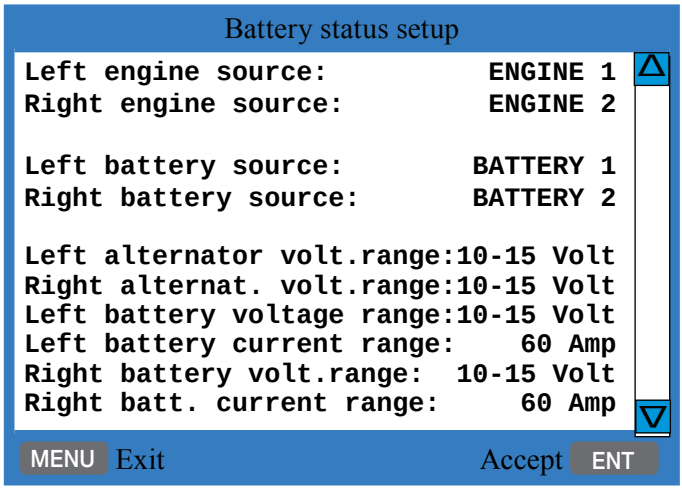
ENT *Confirm entry or exit with* [MENU] *without making any changes*

7.3 Battery status

MENU
5,3 *Call up the menu bar, and... load the Battery status display*



To change the default ranges:
ADJ *Load Battery status setup*
- see display example next page.


Battery status setup
Left engine source: ENGINE 1
Right engine source: ENGINE 2
Left battery source: BATTERY 1
Right battery source: BATTERY 2
Left alternator volt.range:10-15 Volt
Right alternat. volt.range:10-15 Volt
Left battery voltage range:10-15 Volt
Left battery current range: 60 Amp
Right battery volt.range: 10-15 Volt
Right batt. current range: 60 Amp
MENU Exit
Accept ENT

Left engine source - use +/- to toggle between connected engines.

Right engine source - use +/- to toggle between connected engines.

Left battery source - use +/- to toggle between connected batteries.

Right battery source - use +/- to toggle between connected batteries.

Left alternator voltage range, default is 10-15 Volt. Selectable in steps i.e. 10-15, 20-30 or 26-41 Volt (use +/- keys).

Right alternator voltage range, default is 10-15 Volt. Selectable in steps i.e. 10-15, 20-30 or 26-41 Volt (use +/- keys).

Left battery voltage range, default is 10-15 Volt. Selectable in steps i.e. 10-15, 20-30 or 26-41 Volt (use +/- keys).

Left battery current range, default is 60 Amp. Selectable in steps from 10 to 1000 Amp (use +/- keys).

Right battery voltage range, default is 10-15 Volt. Selectable in steps i.e. 10-15, 20-30 or 26-41 Volt (use +/- keys).

Right battery current range, default is 60 Amp. Selectable in steps from 10 to 1000 Amp (use +/- keys).

ENT *Confirm entry or exit with* [MENU] *without making any changes*

7.4 Second set of engine monitoring displays

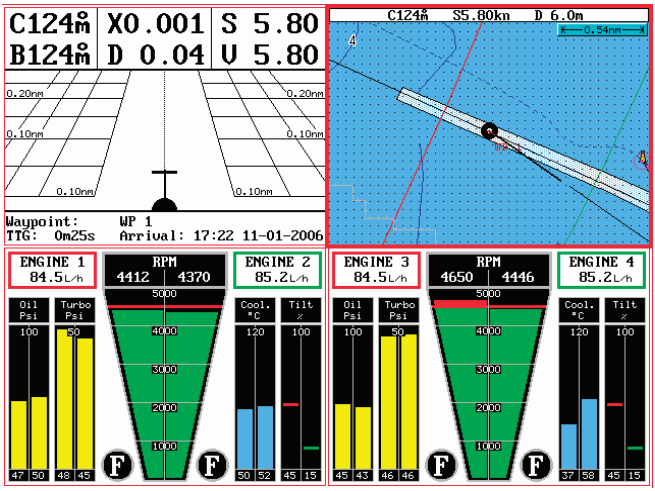
The menu points 4, 5 and 6 are a second set of displays, which only will be visible if the system detected more than two engines on board.

MENU 5,4 *Call up the menu bar, and... load the 2nd Engine status display* - refer to section 7.1.

MENU 5,5 *Call up the menu bar, and... load the 2nd Fuel and transmission display* - refer to section 7.2.

MENU 5,6 *Call up the menu bar, and... load the 2nd Battery status display* - refer to section 7.3.

☞ Any one of these displays can be added to the custom screen presented on page 7-2 e.g.:



This custom made screen is presenting engine data for a 4-engine system. Refer to section 6.8 Pilot custom screens, where you also can read how you go about exchanging one of the current displays with a new one.

7.5 Demo mode

For the purpose of demonstration, the engine function has a demo mode, which can present static simulated read-outs. To run a demo of the engine monitoring system:

MENU
8,2
Call up the menu bar, and...
load the Interface setup

PLOT
Use the [PLOT] *key to go to the Engine tab*

Go to the bottom line and toggle the demo mode on and off with +/-

ENT
Confirm entry and exit

☞ Remember to turn off the demo mode again! The monitoring system will not present any actual readings when the demo mode is running.

8. Miscellaneous menu

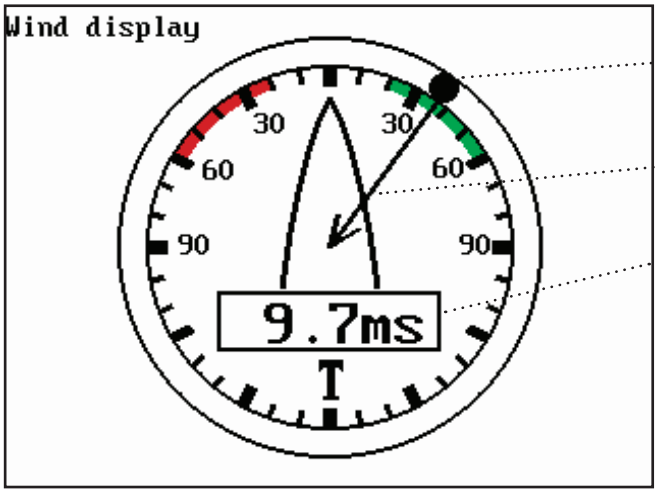
6 MISC	
1 Wind	- see section 8.1
2 Speed diagram	- see section 8.2
3 Decca lanes	- see section 8.3
4 Loran C	- see section 8.4
5 Satellites	- see section 8.5
6 DGPS	- see section 8.6
7 SDGPS	- see section 8.7
8 DSC info	- see section 8.8

8.1 Wind display

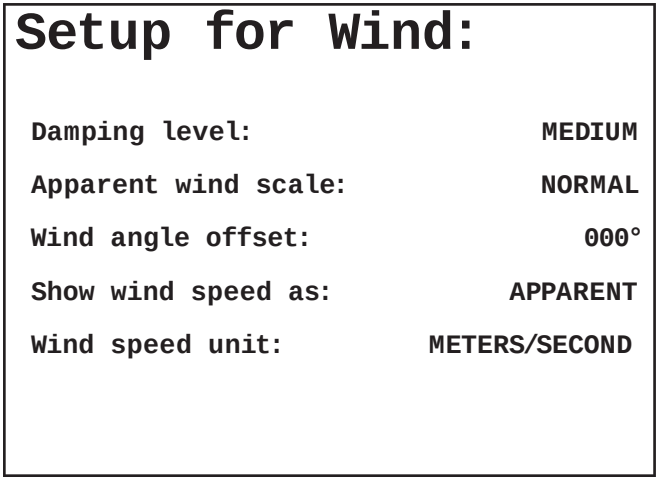
The CX34/44/54 is ready to present wind data from instruments connected via NMEA0183 or SimNet.

MENU
6,1

Call up the menu bar, and...
load the 'Wind instrument' display



ADJ *Load Setup for Wind display*



Go to the function you wish to change

+/- *Toggle between settings, or...*

0-9 *Key in new figure*

ENT *Confirm entry and return to Wind display*

Damping level - can be set to LOW, MEDIUM or HIGH. The higher level the more steady and slow reacting reading.

Apparent wind scale - can either be set to NORMAL (0-180°) or MAGNIFIED (0-60°).

Wind angle offset - can be from 0 to 360°.

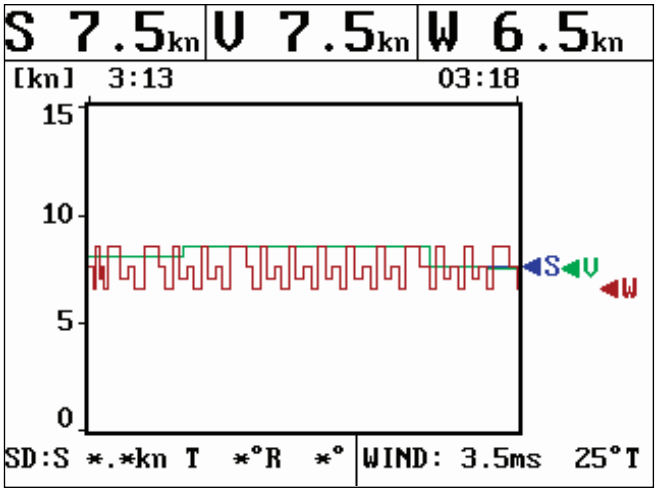
Show wind speed as - APPARENT or TRUE.

Wind speed unit - can be either METER/SECOND, KNOTS, KILOMETERS/HOUR or MILES/HOUR.

8.2 Speed diagram

MENU
6,2

Call up the menu bar, and...
load "Speed diagram"



S= Speed over ground.

V= Velocity towards waypoint.

W*= Speed through water.

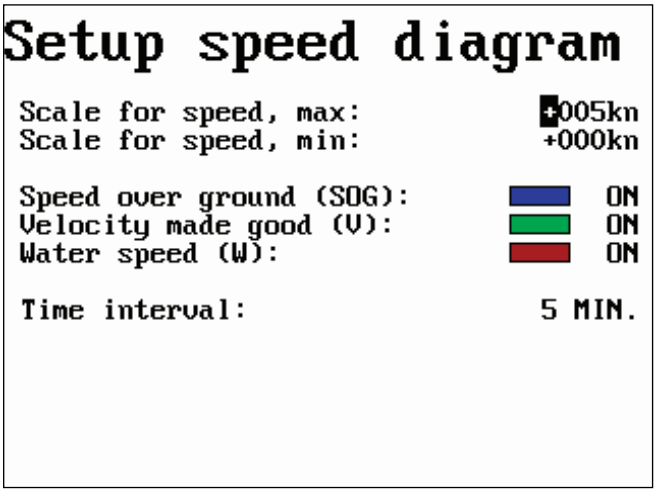
SD (Set and drift)*= Speed and direction, true or relative.

WIND*= Speed and direction.

* *Connection to external sensors is required.*

ADJ

Call "Speed diagram setup"
- see next page.


Setup speed diagram
Scale for speed, max: +005kn
Scale for speed, min: +000kn
Speed over ground (SOG): ON
Velocity made good (V): ON
Water speed (W): ON
Time interval: 5 MIN.

The scale for the speed diagram can be adjusted in this display.

Time interval can be set in intervals from 5 minutes to 3 hours and freeze.

Go to the function you wish to change

+/- *Key in new figure or change setting*

ENT *Confirm entry and return to Speed diagram*

8.3 Decca lanes

MENU *Call up the menu bar, and...*
6,3 *load decca chain display*

ADJ *Open for change*

+/- *Leaf through the available chains* - see listing below.

ENT *Confirm entry*

To change the position readouts to decca mode, see section 10.4 under Pilot/Position setup, where 'Display position as' can be toggled to 'Decca'.

List of decca chains:

00 S Baltic	0A	24 Skagerak	10B
01 Vestlandet	0E	25 N Persian	5C
02 SW British	1B	26 S Persian	1C
03 North Humber	2A	27 Bombay	7B
04 Holland	2E	28 Calcutta	8B
05 British	3B	29 Bangladesh	6C
06 Lofoten, Norway	3E	30 Hokkaido	9C
07 German	3F	31 Tohoku	6C
08 N Baltic	4B	32 Kyusyu	7C
09 NW Spanish	4C	33 Namaqua	4A
10 Trondelag (N)	4E	34 Cape chain	6A
11 English	5B	35 E Province	8A
12 N Bothnian	5F	36 Dampier	8E
13 S Spanish	6A	37 Port Hedld	4A
14 N Scottish	6C	38 Hokuriku	2C
15 Finland	6E	39 Newfoundld.	2C
16 Danish	7B	40 Cabot strt	6B
17 Irish	7D	41 Nova Scotia	7C
18 Finnmarken	7E	42 Salaya	2F
19 French	8B	43 Kanto	8C
20 S Bothnian	8C	44 SW Africa	9C
21 Hebridean	8E	45 Natal	10C
22 Frisian	9B	46 Shikoku	4C
23 Helgeland	9E		

8.4 Loran C

MENU *Call up the menu bar, and...*
6,4 *load Loran C chain display*

ADJ *Open for change*

+/- *Leaf through the available chains* - see listing below.

If required, go to the slaves, and...

+/- *Toggle between available slaves* (not all chains have more than one slave)

0-9 *...and it is possible to alter the figures in the time delay*

If required, go to Offset, and key in a positive or negative offset

0-9 *Key in a positive or negative offset to the time delay (toggle positive/ negative with +/-)*

ENT *Confirm entry*

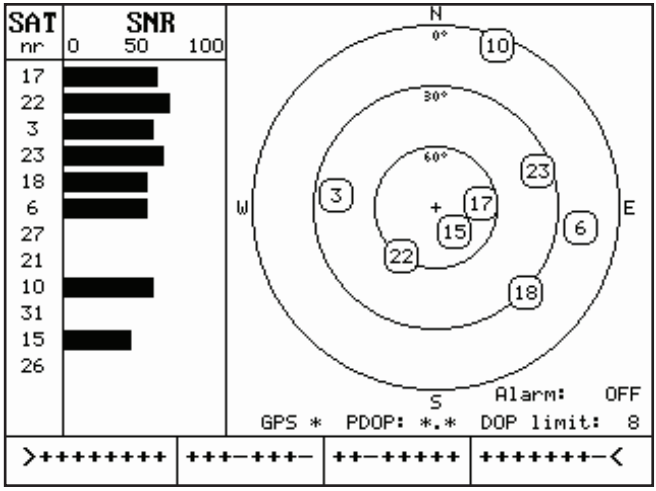
To change the position readouts to Loran C mode, see section 10.4 under Pilot/Position setup, where 'Display position as' can be toggled to 'Loran C'.

List of Loran C chains:

Central Pacific	4990	Commando Lion	5970
Gulf of Alaska	7960	North West Pacific	9970
Southeast U.S.	7980	Norwegian Sea	7970
Great Lakes	8970	Mediterranean Sea	7990
Northeast U.S.	9960	Icelandic	9980
Canadian West Coast	5990	Saudi Arabia South	7170
Canadian East Coast	5930	Saudi Arabia North	8990
Labrador Sea	7930	Eastern U.S.S.R.	7950
West Coast U.S.	9940	Western U.S.S.R.	8000
North Pacific	9990		

8.5 Satellite status

MENU *Call up the menu bar, and...*
6,5 *load satellite status display*



The display will show which satellites are currently being used for computation of data. It will show their position together with SNR - Signal to Noise Ratio. The bottom line shows the status of all the satellites in the GPS system, starting from left to right with the numbers 1 to 32.

Satellite status (bottom line):

+	indicates the satellite is healthy.
-	excluded or non-existing satellite.
0	satellite data is faulty.
*****	satellite is manually excluded.

You may want to exclude a satellite manually in case a particular satellite is disturbing the navigation:

ADJ *Open for change, and...*

Place the cursor on the satellite in the bottom line you wish to exclude

\- *The minus key will exclude the satellite, and...*
\+ *the plus key will reinstate it*

ENT *Confirm entry*

Position update alarm "Alarm" in the satellite status display is preset to "OFF". If the received position data is invalid, the position shown in the position display will start to flash. A position update alarm can be set ON/OFF from the satellite status display [MENU],[6],[5]:

ADJ *Open for change*

Go to "Alarm"

+/- *Toggle alarm ON/OFF*

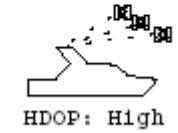
ENT *Confirm entry*

☞ Reset the alarm by [CLR].

Status indicator: GPS * - see section 6.3.

HDOP, PDOP and DOP limits The value of HDOP (horizontal dilution of precision) expresses "the quality" of the satellite geometry in relation to 2D positioning and a fixed antenna altitude.

PDOP (position dilution of precision) is equivalent to 3D positioning. The values will typically stay between 1.3 and 8. The lower the value the higher the "quality". A poor geometry might produce a value of more than 20.



If preset DOP limit is exceeded (indicated by * in the position display) it will cause the position updating to stop until it once again is within the limit.

The DOP limit can be changed manually, but should not be set to higher than 8 (default), as this may result in poor accuracy i.e. false position. To change the DOP limit from the satellite status display [MENU], [6], [5] :

ADJ *Open for change*

Go to DOP limit (6-20), and...

0-9 *Insert new limit*

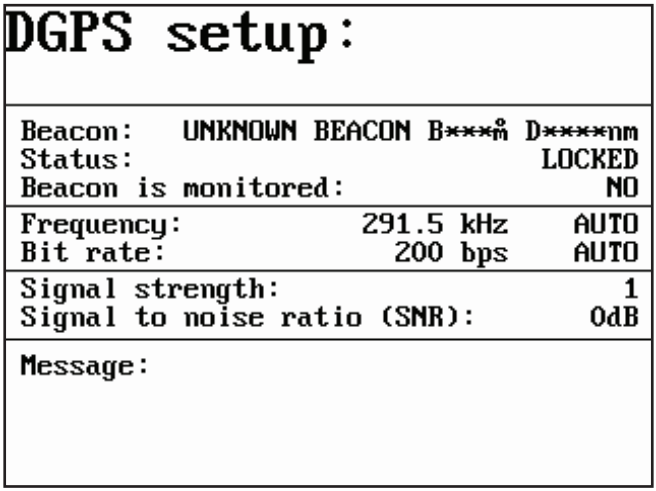
ENT *Confirm entry*

8.6 DGPS information

The DGPS - differential position corrections - can be provided from a built-in module, which is preset to full automatic operation, or from connected DGPS receiver - see “Status indicator” in position display.

☞ List of beacon stations is available in addendum, part no. 183-0122-501.

MENU *Call up the menu bar, and...*
6,6 *load DGPS setup display (with built-in module)*



To receive valid differential data will require that the navigator is locked in on a beacon station.

Frequency (station) and bit rate can be selected manually:

ADJ *Open for change, and...*

Go to the function you wish to alter

+/- *Toggle the function, or...*
0-9 *insert new figures*

ENT *Confirm entry*

Beacon - informs the name of the beacon the navigator is locked on to (if any), together with indication of bearing and distance.

Status - can either be:
LOCKED = locked on a beacon and receiving differential data.
NOT LOCKED = not locked on a becon and receiving no differential data.
NOT INSTALLED = there is no built-in DGPS module in unit.
NOT IN USE = external DGPS receiver applied.

Beacon is monitored - YES or NO.
If YES it should be safe to rely on the received differential data, because the beacon station's performance is under observation.
If NO, then you have to use the received differential data with caution, as there is no guarantee it is not faulty.

Frequency - the frequency of the beacon station can be set manually if known. However, when left in AUTO the navigator will always search for the nearest station with a good signal strength.

Bit rate - indicates *bits per second*, and can be set manually to 25, 50, 100 or 200 bps.

Signal strength - a good signal strength is 20 and up.

Signal to noise ratio (SNR) - should be 8dB and up.

Message - type 16 message will be displayed when received from the DGPS system. The contents of this message could be something to do with the performance of the system. Temporarily out of service etc.

8.7 SDGPS information

The SDGPS - satellite differential GPS - is preset to full automatic operation, which means that the system will utilize the position corrections from either differential GPS stations (refer to section 8.6) or satellite differential GPS signals from WAAS, EGNOS or MSAS (refer to section 8.7.1).

MENU *Call up the menu bar, and...*
6,7 *load SDGPS setup display*

```
SDGPS setup:
 SDGPS select mode:                PASSIVE
 Uses corrections from:              *****
CHANNEL 1: sat.no.:     ****      ****
 Corrections:                        NONE
 Integrity messages ok:                NO
 Range used for position fix:          NO
 Type 0 warning received:              NO
CHANNEL 2: sat.no.:     ****      ****
 Corrections:                        NONE
 Integrity messages ok:                NO
 Range used for position fix:          NO
 Type 0 warning received:              NO
 Ignore type 0 warnings:               NO
```

ADJ *Open for change*

Go to the function you wish to alter (see below)

+/- *Toggle the function*

ENT *Confirm entry*

SDGPS select mode determines which differential corrections can be used in the position determination:
AUTO mode: Local area DGPS corrections are used when available. If not available, then SDGPS corrections are used (if these are available).
PASSIVE mode: SDGPS corrections are never used (see section 8.7.1).
MANUAL mode: SDGPS corrections are used (if available). Local area DGPS corrections are not used.

Uses corrections from - indicates which differential corrections (DGPS or SDGPS) are currently used for position determination.

CHANNEL 1: sat.no. - indicates which satellite number and name is currently tracked/searched by channel 1, and what is the tracking state.

Corrections - indicates if corrections are being received on this channel. If YES: is the quality of the reception sufficiently high for the corrections to be usable.
NONE: no corrections are received.
RECEIVED: corrections are received, but of insufficient quality.
USABLE: corrections are received and of sufficient quality.
USED: corrections received on this channel are used in the position determination.

Integrity messages ok - the SDGPS system will transmit messages concerning the integrity of the GPS satellites. This line will indicate whether such messages are received and reliable.

Range used for position fix - if the receiver is tracking a particular SDGPS satellite, it "knows" the distance to that satellite. This line will indicate whether the distance is used in the position determination.

Type 0 warning received - if an SDGPS satellite is not operating according to specifications it will transmit a so-called "Type 0 warning". In this situation, the receiver will not use any information that it might receive from that satellite. Until the SDGPS system is declared operational, the SDGPS satellites will always transmit Type 0 warnings.

☞ It is possible (but not recommendable) to override the Type 0 warnings - refer to last line in SDGPS setup: "Ignore type 0 warnings: NO" should be changed to "YES".

8.7.1 Satellites in SDGPS system

The SDGPS system consist of eight orbiting geostationary satellites and is designed to form a seamless global augmentation system consisting of Waas (USA), EGNOS (Europe) and MSAS (Japan). If all three parts would become operative at the same time, there would be no performance problem. However, since WAAS is the only system currently in normal operation, the WAAS correction signals can have a negative effect on receivers operating in Europe and Far East outside the intended WAAS coverage area. In these areas, we recommend that the 'SDGPS select mode' is changed from 'AUTO' to 'PASSIVE'.

☞ Refer to Addendum no. 183-0002-000 (included in the package) for up-to-date information on the current status of the SDGPS system.

Number	Name	System	Area
120	AOR-E	EGNOS - EU	Atlantic ocean region east
122	AOR-W	WAAS - US	Atlantic ocean region west
124	ARTEMIS	EGNOS - EU	
126	INMARSAT	EGNOS - EU	
129	MTSAT-1	MSAS - JAPAN	
131	IOR	EGNOS - EU	Indian ocean region
134	POR	WAAS - US	Pacific ocean region
137	MTSAT-2	MSAS - JAPAN	

Tracking state

The letter indicating the tracking state will appear immediately after the satellite number in the display.

Letter indication:	*- means that the receiver is:*
S	searching for satellite.
D	trying to synchronize to data stream.
C	code locked to signal.
P	phase locked to signal.

8.8 DSC VHF info

To receive an iDSC Alarm and Message from VHF will require that the CX34/44/54 is connected to a compatible Simrad VHF radio-telephone. The data is transmitted via NMEA or SimNet.

The message from the VHF will appear in a pop-up window together with an acoustic alarm. Press [CLR] to reset the alarm, or press [ENT] to stop alarm and select the suggested channel for communication - refer to the VHF manual for further details.

To view the last received message:

MENU
6,8

Call up the menu bar, and...
load the DSC info display

9. Waypoint / route menu

7 WP/RTE	
1 Waypoints	- see section 9.1
2 Routes	- see section 9.2
3 Route calculation	- see section 9.3
4 Lines	- see section 9.4
5 Tracks	- see section 9.6
6 Targets	- see section 9.7
7 MOB data	- see section 9.8
8 Data transfer	- see section 9.9 to 9.11

9.1 Waypoints stored in the memory

The waypoint list will appear in alphabetical order and will include the waypoint's position in lat/long. To edit one of the stored waypoints:

MENU
7,1

Call up the menu bar, and...
load waypoint list

Waypoint: WP 2		
x WP 1	57°14.853N	9°51.966E
x WP 10	55°59.954N	10°47.247E
x WP 11	55°59.203N	11°15.562E
x WP 2	57°20.289N	10°01.404E
x WP 3	57°24.990N	10°15.561E
x WP 4	57°24.990N	10°39.831E
x WP 5	57°14.490N	10°58.708E
x WP 6	57°01.385N	11°06.798E
x WP 7	56°50.773N	10°47.921E
Number of stored waypoints:		11

A-Z *Insert name of waypoint you wish to edit, or...*

+/- *Leaf through waypoints with +/- keys or up/down cursor*

ENT *Open for editing*

Place the cursor on the function you wish to change

0-9 *Key in new figures, or...*
+/- *toggle between available values*

PLOT *Move the position to ship's position*

ENT *Confirm entry and return to WP list*

☞ Plot new waypoints with the [PLOT] key - refer to section 4.4.9.

9.1.1 Delete waypoints via menu

MENU *Call up the menu bar, and...*
7,1 *load waypoint list*

+/- *Select waypoint you wish to delete*

ENT *Open for editing*

WIN *Delete waypoint*

CLR *Confirm that you want to delete the selected waypoint*, if not sure: press [MENU] to exit the display without having made any changes.

☞ Edit waypoints directly on the chart via info windows, refer to section 4.4.3.

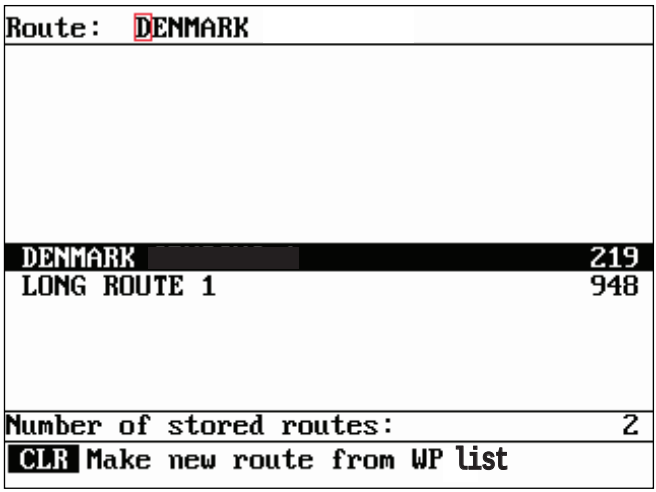
9.2 Routes stored in the memory

The route list will keep a record of all the saved routes in the system. It will provide information on number of waypoints in the route etc. Existing routes can be altered via the route list - see further on in this chapter, or directly on the chart via info windows - refer to sections 4.4.4 and 4.4.5. To delete a route - refer to section 9.2.1.

☞ Making new routes can be done directly on the chart with the PLOT function - refer to section 4.4.9, or from the WP list using existing waypoints - refer to section 9.2.2.

MENU
7,2

Call up the menu bar, and...
load route list display



+/-

Toggle through the stored routes with the +/- keys, or...

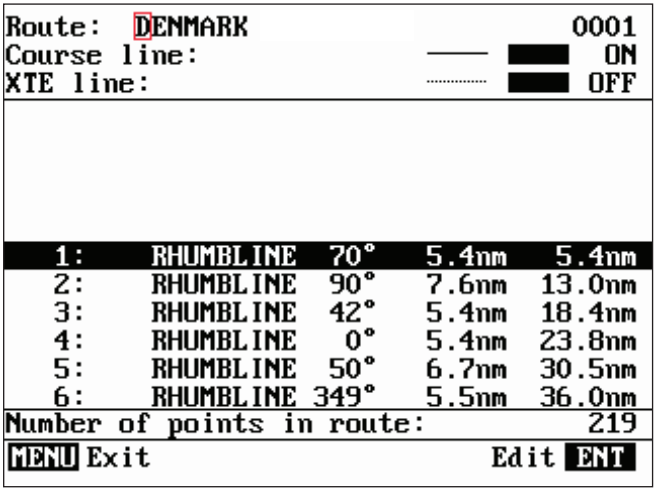
A-Z

Select route by entering its name

Move the cursor up/down to select a specific route

ENT

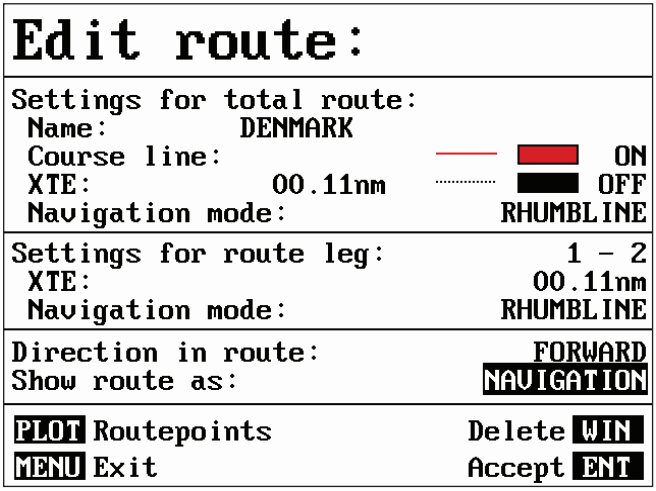
Call up the details on highlighted route
- see next page.


Route: DENMARK 0001
Course line: ON
XTE line: OFF
1: RHUMBLINE 70° 5.4nm 5.4nm
2: RHUMBLINE 90° 7.6nm 13.0nm
3: RHUMBLINE 42° 5.4nm 18.4nm
4: RHUMBLINE 0° 5.4nm 23.8nm
5: RHUMBLINE 50° 6.7nm 30.5nm
6: RHUMBLINE 349° 5.5nm 36.0nm
Number of points in route: 219
MENU Exit
Edit ENT

This display provides information on course line, XTE line, route legs, routepoints etc.

ENT

Call up the Edit route display - if you wish to make any changes. (Editing a route currently used for navigation is not possible)



Setting the Course line to OFF in this display will make the route invisible on the screen. Put it back on the screen by setting it ON again. The course line and XTE line can be changed in color - there are a total of 15 colors to choose from together with 9 different line types.

If the XTE distance is not the same in all legs, the value will be *.* instead of the 00.10nm. Navigation mode can be either RHUMB-LINE or GREAT CIRCLE, or... if not set to the same in all legs in a route, the mode will be: COMPOSITE.

Direction in route can be set to either FORWARD or REVERSE direction.

Show route as can be set to either NAVIGATION for navigational data in the route display (example on the previous page), or POINTS for a list of routepoints together with the position in lat/long and the XTE limit of each point.

Place the cursor on the function you wish to change

0-9
+/-

Key in new figures, and...
toggle between available values
- if no more alterations are required, go to [ENT], or you can insert/remove routepoints from the route by entering a new display:

PLOT

Open for the function: Remove/insert routepoints

+/-
CLR

Existing routepoints can be removed, by using the +/- keys to highlight the routepoint you wish to remove, and press [CLR]

New routepoints can be added to the route by using the cursor to go up/down in the WP list to select the position you wish to add to the route, then...

+/-
PLOT

By means of the +/- keys highlight the routepoint where you wish the new position should be placed in the route, and press [PLOT]
- the last point in the RtePt panel is empty, and as such will allow you to enter a new final routepoint.

ENT

Confirm modification of route and return to the Edit display
- or abandon modification by pressing [MENU]

ENT

Confirm editing

MENU

Return to route list

9.2.1 Delete route via menu

MENU
7,2
Call up the menu bar, and...
load route list display

+/-
Select the route you wish to delete

ENT
Call up the details on highlighted route

ENT
Open for editing

WIN
Delete route

CLR
Confirm that you want to delete the selected route, if not sure: press [MENU] to exit the display without having made any changes.

☞ Edit routes directly on the chart via info windows, refer to section 4.4.4 and 4.4.5.

9.2.2 Make new route from WP list

When you have a number of waypoints stored in the WP list which would be convenient to link together as a route it is easily done via the route list.

MENU
7,2
Call up the menu bar, and...
load route list display

CLR
Make new route from WP list

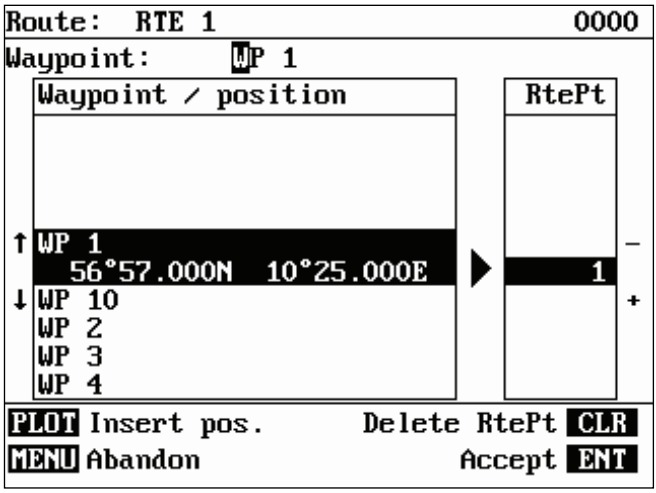
Use the cursor to go up/down in the WP list to select the position you wish to add to the route, then...

+/-
PLOT
By means of the +/- keys you can control where the highlighted position is placed in the route, press [PLOT]
- the last point in the RtePt panel is empty, and as such will allow you to enter a new final routepoint. Once a WP position is transferred to the routepoint section, there is no longer any connection between the position and the waypoint in the WP list.

Select the next position and press [PLOT]. Continue in this manner until the route is completed. In case you make a wrong plot, you can delete the routepoint by highlighting the RtePt number by means of

the +/- keys and then press [CLR] to remove the point from the route.

Display example:



ENT *Save the route with* [ENT] *and go to the Edit display*
- or leave the function with [MENU] to abandon the route.

In the Edit route display you can set up the route preferences you need and also change the name of the route.

Place the cursor on the function you wish to change

0-9 +/- *Key in new figures, and... toggle between available values*

ENT *Confirm editing*

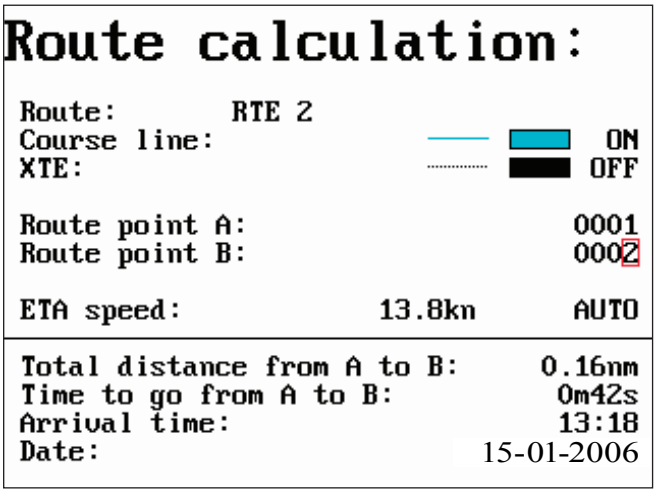
MENU *Return to route list*

9.3 Route calculation

To stay well informed during navigation, the Route calculation display will provide information on how long it takes to go from one point to another, total distance, arrival time etc.

MENU
7,3

Call up the menu bar, and...
load route calculation display



+/-

Toggle between available routes in the memory

Go to Routepoint A, and...

0-9

Select the first routepoint (A) from where you wish to start the calculation in the route, and then select the second point (B)

Present speed is automatically used for calculating the arrival time, but if required, an alternative speed can be inserted:

ENT

Open for change

0-9

Key in a new speed value

+/-

Toggle between AUTO *and* MANUAL

ENT

Confirm entry

9.4 Lines stored in the memory

The line list will keep a record of all the saved lines in the system. It will provide information on number of line sections in line etc.

'Lines' are used for defining a certain area on the chart e.g. a fishing ground, a shipwreck, large rocks, restricted areas etc., or defining a channel to sail through narrow passages, making your own coast line or for whatever reason you could use a drawing on the chart.

☞ To draw new lines you need a chart in the active window, place the cursor where you wish to start the line, and press [PLOT]. Then follow the instructions in the info windows. Refer to section 4.4.9. Lines can also be edited directly on the chart via info windows, refer to section 4.4.4 and 4.4.5.

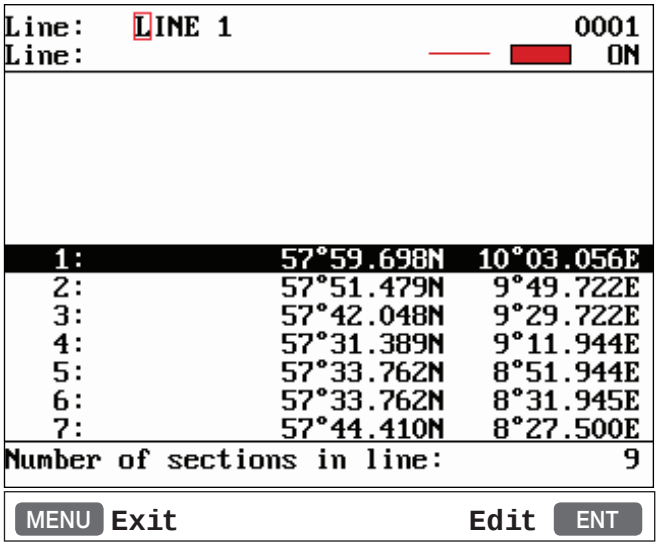
MENU
7,4 *Call up the menu bar, and... load line list display*

+/- *Toggle through the stored lines with the +/- keys, or...*

A-Z *Select line by entering its name*

Move the cursor up/down to select a specific line

ENT *Call up the details on highlighted line*



This display indicates how many line sections are used for the drawing.

Leaf through the line points by moving cursor up/down

ENT *Call up the Edit line display* - if you wish to make changes.

Turning “Line” OFF will make the line drawing invisible on the screen. Put it back on the screen by turning it ON again.

Place the cursor on the function you wish to change i.e. name, line type or color

+/- *Toggle between available values*

ENT *Confirm editing*

MENU *Return to line list*

9.4.1 Delete lines via menu

MENU *Call up the menu bar, and...*
7,4 *load line list display*

+/- *Select the line you wish to delete*

ENT *Call up the details on highlighted line*

ENT *Open for editing*

WIN *Delete line*

CLR *Confirm that you want to delete the selected line*, if not sure: press [MENU] to exit the display without having made any changes.

☞ Edit lines directly on the chart via info windows, refer to section 4.4.4 and 4.4.5.

9.5 Start / stop track

The track function will provide a track trailing the movement of your ship. As default from the factory, the first track is stored as TRACK 1, the next as TRACK 2 etc.

To start track function:

PLOT *Call up the PLOT menu*
7 *Load Start track pop-up window*

If you wish to change the default values:

Move cursor to where you wish to make a change

+/- *Toggle between available values, or...*
0-9 *key in new values*

ENT *Start track*

Name of track can be altered (max. 25 characters).

Display track can be set ON and OFF, where OFF will make it invisible on the screen. Turn ON to put it back on the screen.

Update of the track can be performed by distance in nautical miles, or by time interval.

Type of track line i.e. full, dotted, etc. has 9 different types to choose from in 15 different colors.

To stop track:

PLOT *Call up the PLOT menu*
8 *Load Stop track pop-up window*

ENT *Stop the highlighted track*

9.6 Tracks stored in the memory

All tracks (of more than 1 trackpoint) will automatically be stored in the memory. To see which tracks are registered, you can scroll through the list by:

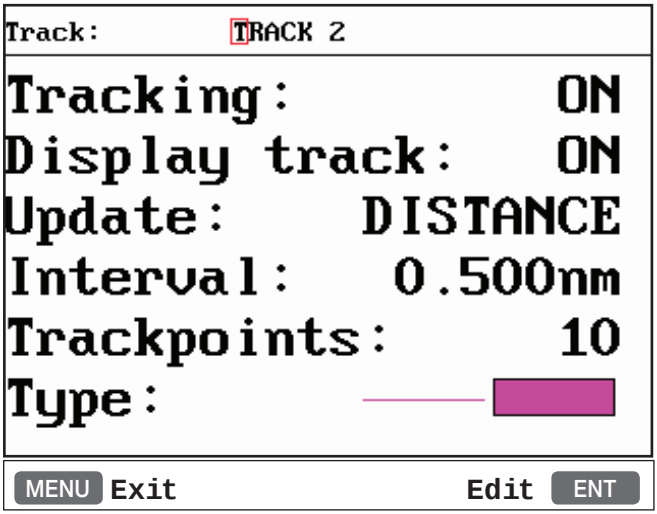
MENU *Call up the menu bar, and...*
7,5 *load track list display*

+/- *Toggle through the stored tracks with the +/- keys, or...*

A-Z *Select track by entering its name*

Move the cursor up/down to select a specific track

ENT *Call up the details on highlighted track*



Example: Active track

ENT *Open for change*

"Display track" can be set ON/OFF, where OFF will make it invisible on the screen. Turn ON to put it back on the screen.

+/- *Toggle between available values*

ENT *Confirm changes*

MENU *Return to track list*

9.6.1 Delete tracks via menu

MENU *Call up the menu bar, and...*
7,5 *load track list display*

+/- *Select the track you wish to delete*

ENT *Call up the details on highlighted track*

ENT *Open for editing*

WIN *Delete track*

CLR *Confirm that you want to delete the selected track*, if not sure: press [MENU] to exit the display without having made any changes.

☞ Edit tracks directly on the chart via info windows, refer to section 4.4.6.

9.7 Targets stored in the memory

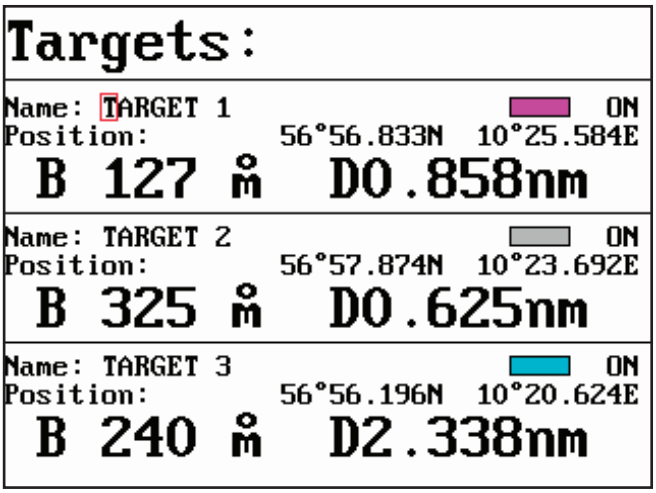
The CX34/44/54 can display the bearing and distance of up to three targets at a time in relation to the vessel e.g. harbors or important navigational points. A target is a fixed point on the chart which can be plotted by the cursor or from the ship's position - refer to section 4.4.9, or keyed in via the keypad - refer to section 4.4.7.

Set up targets

The plotted target position is automatically preset to actual position of ship, or to cursor position when the chart display is active and the cursor is on - see INFO windows, section 4.4.7.

MENU
7,6

Call up the menu bar, and...
load target display



Make the target invisible on the screen by turning it OFF.

Put it back on the screen by turning it ON again.

Select the target you wish to change or replace with a different target by moving the cursor up/down

+/-

Leaf through the targets in the memory

ENT

Open for change, and...

Place cursor where you wish to make a change i.e. name, color etc.

A-Z
0-9

Key in new values, alphabetical or numerical

+/- *Toggle between available values*

ENT *Confirm entry*

9.7.1 Delete target via menu

MENU
7,6 *Call up the menu bar, and... load target display*

+/- *Select the target you wish to delete*

ENT *Open for editing*

WIN *Delete target*

CLR *Confirm that you want to delete the selected target*, if not sure: press [MENU] to exit the display without having made any changes.

☞ Edit targets directly on the chart via info windows, refer to section 4.4.7.

9.8 MOB data

MENU
7,7 *Call up the menu bar, and... load MOB data display*

MAN OVERBOARD	
DATE	15-01-2006
TIME	14:23:34
MOB	56°52.489N
POS	009°50.305E

The MOB display will provide information of the last activated MOB position. To delete a MOB track from the memory, see section 4.4.6.

9.9 Data transfer via DataCard or disc

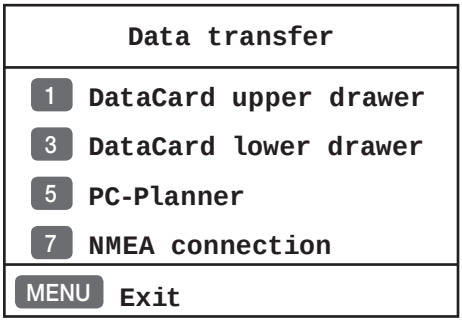
Data transfer to and from external memory can be performed via Simrad DataCard, or with a Simrad TL50 Turbo Loader (CX44/54) via an ordinary 1.44Mb disc.
DataCards and TL50 Turbo Loader are optional equipment available from your local Simrad dealer.
How to perform data transfers via TL50 (including data from Shipmate RS2500 Trackplotter) is described in the TL50 manual.

Use the Simrad DataCard or TL50 Turbo Loader to make backup files of all the user data you have created plus the current setups in the internal memory of the unit. Do it whenever you have added important data, or when you wish to transfer routes and waypoints, etc. to another compatible unit. The storage capacity of the DataCard/TL50 disc is divided into two databanks of each 450 Kb, meaning that the entire internal memory can be stored in one databank.

External memory with data transfer via DataCard:

MENU
7,8

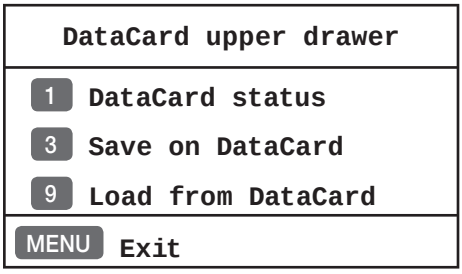
Call up the menu bar, and...
load the Data transfer window



- see section 9.10
- see section 9.11

1

Select the drawer where you have inserted the DataCard e.g. [1]:



DataCard status

1 *Press* [1] *to find out what data (if any) is stored on the DataCard*
The capacity is divided into two databanks: DATABANK 1 and 2 which can hold approx. 2 x 450 Kb data. Toggle between the two databanks with the +/- keys.

Save on DataCard

3 *Press* [3] *to call up a new INFO window* where you can see which data will be transferred i.e. routes, waypoints, etc. and how much space it will take up in bytes + percentage of max. storage capacity. The actual date and time will be saved with the data transfer.

+/- *Use the +/- keys to toggle between DATABANK 1 and 2*

A-B *Use the alphanumeric keys to add a name to the data in the selected databank*

Use the cursor key to go to the 'Action' *column* to decide which action you want taken for each mentioned category of data (toggle with +/- keys) - see section 9.9.1.

If you choose to MERGE the data already stored on the DataCard with the data coming from the Internal memory, the bottom line in the window will ask you to press [ENT] to: Calculate databank after merge.

ENT *Press* [ENT] *to activate 'Save selected data on DataCard'*

You will now receive a warning about which data on the DataCard, in the selected databank, will be overwritten. Press [ENT] to accept. After the data has been transferred, you will receive a status report.

MENU *Press* [MENU] *to exit function*

Load from DataCard

9 *Press* [9] *to call up a new INFO window* where you can see which data is stored in Databank 1 or 2 on the DataCard - see display example next page.

+/- *Use the +/- keys to toggle between DATABANK 1 and 2*

User data generated by other chartplotter models e.g. CE42/52, CP42/52, CA42/52, CR42/52, CX33 can all be transferred to a CX34/44/54 unit via the Data transfer system.

However, it is not immediately accessible to transfer data via DataCard from the new model CX34/44/54 to the older model CA42, etc., as this would require an update of the CA42.
- For more information, please contact an authorized Simrad dealer.

Load from DataCard: DATABANK-1

```
Data generated by:                                  Simrad CX44
Used internal memory:                    193393 bytes =  42%
Used DataCard memory:                      2677 bytes =   1%
Used internal memory after operation:    191400 bytes =  42%
Date saved:                                        15-02-2003
Time saved:                                          19:43:00
Name:
```

Data type	Internal Amount	Internal Bytes	DataCard Amount	DataCard Bytes	Internal after Amount	Internal after Bytes	Action
Marks/waypoints:	9	244	11	256	9	244	NO
Lines:	0	0	2	168	2	168	OVERWRITE
Routes:	1	168	4	408	4	408	OVERWRITE
Targets:	0	0	1	100	1	100	OVERWRITE
Tracks:	8	190480	0	0	8	190480	NO
Setup:	1	2501	1	1745	0	0	NO

MENU Exit Load selected data from DataCard ENT

Use the cursor key to go to the 'Action' *column* to decide which action you want taken for each mentioned category of data (toggle with +/- keys) - see section 9.9.1.

If you choose to MERGE the data already stored in the Internal memory with the data coming from the DataCard, the bottom line in the window will ask you to press [ENT] to: Calculate databank after merge.

ENT *Press* [ENT] *to activate 'Load selected data from DataCard'*

You will now receive a warning about which data in the internal memory of the unit will be overwritten. Press [ENT] to accept. After the data has been transferred, you will receive a status report.

MENU *Press* [MENU] *to exit and *reboot* (only if loading "Setup")

*) When the system makes a 'reboot' the screen will turn black for a brief moment, then the system will re-start and automatically return to the active display which was on the screen before you made the transfer.

9.9.1 List of criteria for data transfer in the Action column

OVERWRITE - will overwrite existing data in the memory you are transferring data to. Whenever a new 'Setup' is transferred into the main unit, the system will reboot, the screen will turn black for a brief moment and then restart and automatically return to the active display on the screen before you made the transfer.

☞ Transfer of 'Setup' can only be completed between identical units.

MERGE - will mix the transferred data with the data in the memory you are transferring to. Press [ENT] to calculate memory after merge. Identical data will be sorted automatically and not saved twice i.e.:

- 'Marks/waypoints' of same position, name and symbol.
- 'Lines' which are identical.
- 'Routes' of same name, equal number of routepoints (not necessarily in the same position), but with the exact same start point and end point.
- 'Targets' of same position, name and symbol.
- 'Tracks' which are identical.
- 'Setup' can not be merged.

DELETE - will delete existing type of data from the memory you are transferring data to.

NO - no action will take place. The data will remain unchanged.

9.10 Data transfer via DataCard to/from PC-Planner

Data transfer to and from a PC-Planner can be performed via Simrad DataCard. Transfer routes, waypoints and tracks stored in the internal memory of the CX34/44/54 to the PC-Planner or routes and waypoints from the PC-Planner to the CX34/44/54 unit.

MENU
7,8

Call up the menu bar, and...
load the Data transfer window

Data transfer	
1 DataCard upper drawer	- see section 9.9
3 DataCard lower drawer	- see section 9.9
5 PC-Planner	
7 NMEA connection	- see section 9.11
MENU Exit	

5

Select the PC-Planner function - to transfer data, a DataCard must be placed in the drawer below the keypad. Example:

PC-Planner	
Drawer UPPER	Use the +/- key to toggle between the UPPER and LOWER drawer.
1 Import	
2 Export	
Status: DataCard empty	
MENU Exit	

Choose [1] to transfer data (routes and waypoints) from PC-Planner, or choose:

2

Export - to transfer data (routes, waypoints and tracks) to DataCard.

ENT

Press [ENT] *to accept* 'DataCard will be erased ?'

Status will indicate: 'Saving data', and close with 'Transfer completed'. The data on the DataCard is now ready to be loaded into the PC-Planner.

9.11 Data transfer via PC interface

Data transfer to and from a route planning program on a Personal Computer can be made via NMEA connection (Refer to Optional connections in the Installation manual) by means of the standard NMEA0183 sentences WPL and RTE.

☞ The data transfer on these two sentences does not include WP symbol, color, XTE limit, etc.

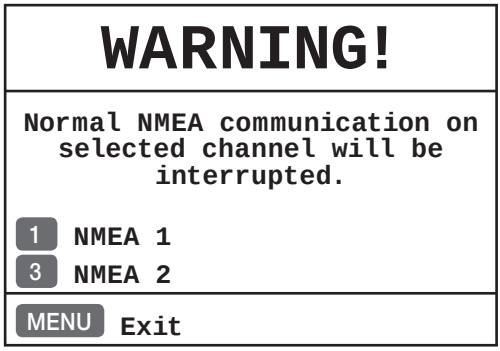
☞ PC-based planning systems differ in operation and performance beyond the control of Simrad.

MENU *Call up the menu bar, and...*
7,8 *load the Data transfer window*

Data transfer	
1 DataCard upper drawer	- see section 9.9
3 DataCard lower drawer	- see section 9.9
5 PC-Planner	- see section 9.10
7 NMEA connection	
MENU Exit	

7 *Select the NMEA connection*

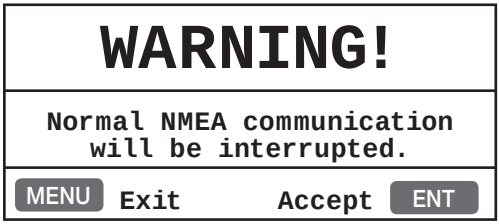
CX44/54 example:



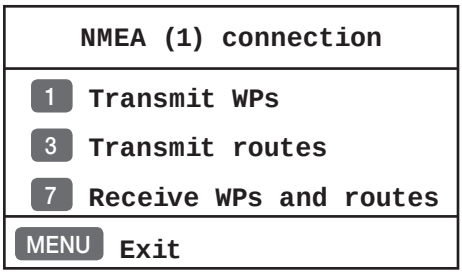
The normal communication via this NMEA port is temporarily interrupted during the time of data transfer.

Press [1] or [3] to select the NMEA port where the PC data cable is connected. This will activate a new window, see next page.

CX34 example:



Press [ENT] to accept warning and continue.



Transmit WPs

1 *Press* [1] *to start transmission of all waypoints stored in the CX34/44/54 WP list to PC*

When the transmission is completed you will receive a new info window informing of how many waypoints were transferred.

MENU *Exit function and return to normal NMEA communication*

Transmit routes

3 *Press* [3] *to start transmission of all routes stored in the CX34/44/54 Route list to PC*

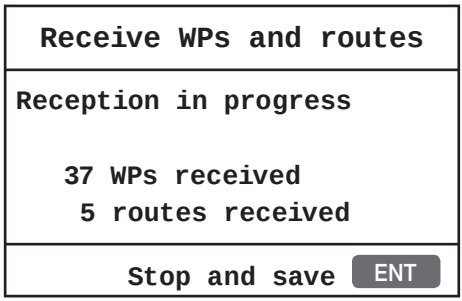
When the transmission is completed you will receive a new info window informing of how many routes were transferred.

MENU *Exit function and return to normal NMEA communication*

Receive WPs and routes

7 *Press* [7] *to enable reception of waypoints and routes from the planning program*

The transmission of waypoints and routes can now be activated from the PC program. The info window below will inform you of the progress of the reception of data by keeping an eye on the counter. When the counter stops, means that all the data from the PC planner has been collected. However, some PC programs may continue to transmit the same data over and over again and will have to be stopped by pressing [ENT].



ENT *Stop and save*
- will stop collecting data (if not already finished) and start saving the collected data.

☞ Waypoints/routes transmitted to the CX34/44/54 are added to the WP/route list. However, if two waypoint/route names are identical, the latest transferred one will not be saved, even though position(s) may be different. Routepoints will not be included in the WP list.

Saving the collected data can take anywhere from less than a second and up to a few minutes, depending on the amount of data. If it takes too long and you need the CX34/44/54 in a hurry, then press the [MENU] key to *Stop saving* any more data - what has been saved until this point will stay in the memory, the rest will be lost.

MENU *Stop saving*

Under normal circumstances we assume the saving procedure is allowed to finish and will indicate “Saving completed” in the info window. You are now ready to:

MENU *Exit function and return to normal NMEA communication*

10. Setup menu

8 SETUP	
RADAR Radar setup	- see section 10.1
CHART C-MAP cartridges	- see section 10.2
ECHO Echosounder setup*	- see section 10.3
PILOT Pilot/Position setup	- see section 10.4
1 Speed alarm, units & language	- see section 10.5
2 Interface setup	- see section 10.6
3 Palette setup	- see section 10.7
4 Factory settings	- see section 10.8
5 QuickGuide	- see section 10.9

*) available with built-in Echosounder function.

10.1 Radar setup

After the installation is completed, check the Radar setup to see if the **Scanner height** is correct and the **Heading adjust** is zero degrees to ship's center line. If not, then they need to be corrected - see further ahead in this section. All default settings from the factory are tested for various situations, however, if your situation is such that adjustments are required, please refer to the details described in this section. The Scanner type is preset to Auto detect and as such, the system will automatically initiate the correct parameters for the connected scanner.

MENU *Call up the menu bar, and...*
8 *activate the SETUP menu, and...*
RADAR *load the Radar setup* - see example next page.

You will now receive a warning that you are about to change settings for the radar. Press [ENT] to Continue, or [MENU] to Abandon.

Use the cursor key to move around in the settings. Toggle between available values with the +/- keys, and insert data by the numeric keys.

ENT *Confirm the adjustments by* [ENT] or [MENU]

Example of Radar setup:

HU **RM** **0.50nm**	Head-Up in Relative Motion Range= 0.50nm
Power off	Power off, X-MIT
TI **0**	Tuning Indicator
Tune AUTO **100**	Tune, Gain, Sea: adjust with +/- keys, and press
Gain AUTO **44**	[CLR] to return to AUTOmatic mode.
Sea AUTO **30**	
Rain **0**	Rain Clutter / FTC
Scanner type **Auto**	/Demo
Scanner height **05m**	5 meters above water
Heading adjust **000.0°**	In degrees to ship's center line
Tuning reference **079**	Adjust with +/-/numeric keys
Zero range/timing **0109**	Adjust with +/-/numeric keys
MBS **050 050**	Main Bang Suppression, level and length (area)
Sensitivity **048**	Adjust with +/-/numeric keys
GZ target threshold **5**	Levels of 1 to 7
Power-on time **000000 h**	Elapsed power-on time
Transmit time **000000 h**	Elapsed transmission time
Sea Auto **025 050 090**	Sea Auto, Sea Harbor and Gain Auto are preset
Sea Harbor **000 025 030**	for best performance under normal conditions.
Gain Auto **020 082 040**	
Scanner status **Activate**	For technicians only.
LOW rpm 30 **HIGH rpm 50**	DX45 and DX60 scanners only.
RPM sog limit **10kn**	DX45 and DX60 scanners only.
Sector 1 **000°** **010°** **OFF**	DX45 and DX60 scanners only.
Sector 2 **000°** **010°** **OFF**	DX45 and DX60 scanners only.

More details on next pages.

Scanner type: is preset to Auto detect. After having installed the scanner (see the Installation manual for selection of scanner), the radar function must stay in **Power off** mode until the scanner type is detected. The system will automatically set up the correct parameters for the connected scanner.

☞ Demo mode – see section 3.3.

Scanner height: enter the actual height above water of the radar antenna/scanner.

Heading adjust: Orientation should be HU (Head-Up). Turn the ship, so a target is just in front and adjust until target is straight ahead on the heading line. Use the +/- keys to position it correctly.

Tuning reference: Normally there should be no need to adjust the Tuning reference. However, if sensitivity is poor or there are any symptoms at all suggesting improper tuning, you may need to make an adjustment: Choose a displayed range of 3nm or higher. Use cursor to go to the Tuning reference value. Use +/- keys to adjust the value in single steps (allowing 3-4 revolutions) until weak echoes in the distance becomes acceptable.

Zero range/timing: Most common settings are between 105 and 115. Default setting depend on which scanner type is connected.
To adjust: Press the [1] key to set the displayed range to 0.125nm. Use cursor to highlight "Sea" and with +/- keys set the sea clutter to zero, then move cursor to MBS level and change all figures to zero, so you can see the transmitting pulse. Now adjust the value for Zero range so the ring around the ship is just closing.
If you have knowledge of the distance to a nearby object, say a mast or a buoy, you can verify if the Zero range is set correctly by measuring the distance. To do so, place the VRM ring on top of the object and check the readout in the control panel (follow procedure in sec. 3.2.5). If the readout is not the same as the known distance, adjust the value in Zero range with 1 figure up/down for every 3 meter adjustment.

MBS - Main Bang Suppression: Each transmitter pulse will result in an immediate strong return signal, which will form a 'sun' (main bang) in the center of the screen. Main bang suppression is a filter, which will eliminate or minimize this effect. The first 3-digit number indicates the level and the last 3-digit number indicates the length (area). Adjustmets can be made for best performance for individual antennas. The first 25 to 30 meters, however, will always be 'blinded' by the transmission pulse. Adjustment of MBS requires STC=0 and reasonable GAIN. If the suppression zone around the center is too large, suppression length can be lowered. If strong targets disappear within the suppression zone, the level of suppression can be lowered.

Sensitivity: is preset to 048. Adjust value if echoes are not reasonable clear i.e. the higher the value, the less detailed presentation of echoes.

GZ target threshold: is preset to 5. Objects are identified according to weak/strong signals. 1= weakest, 7= strongest.

Sea Auto and **Sea Harbor** values for the automatic STC modes i.e. Minimum, Maximum, and Sensitivity. The first two 3-digit numbers define the limits of the automatic functions. These numbers

refer to minimum (first set of numbers) and maximum (second set of numbers) allowed STC value, the automatic function will never use an STC outside this interval. The third set of numbers equals the sensitivity of the function. The higher the number (more sensibility), the more STC filter.
If necessary, the factory presets can be adjusted to expand or limit the effect of the auto function, but first check if Gain Auto needs to be adjusted (see below). After the adjustment, the new values will be the new AUTO settings. If a new scanner type is recognized, these parameters are set to default. During adjustment of minimum and maximum, the display will show the current value. The auto function is active when the sensitivity is adjusted. The auto function parameters will take effect when the auto function is selected.

Gain Auto values for the automatic Gain mode. The first two set of numbers will define the limits of the automatic functions.

• Gain Auto settings
To adjust the preset values, you first have to:
1. Adjust Rain to minimum acceptable value: move cursor to the 'Rain' bar, and adjust with +/- keys.
2. Adjust Sea to minimum acceptable value: move cursor to the 'Sea' bar, and adjust with +/- keys.
3. Set 'Tune' bar to 'AUTO' mode: move cursor to the 'Tune' bar and press [CLR].
4. Choose a displayed range of 6nm (press key [7]) or higher.

Now you are ready to adjust the Gain Auto values in the lower part of the Radar setup display:
First 3 digits - minimum: Adjust to a minimum value, which will show an acceptable radar image.*
Last 3 digits - maximum: Adjust to maximum acceptable level of noise.*
*) wait for screen to update to see the result of adjustment.

• Sea Auto and Sea Harbor settings
Sea Auto should be adjusted to an offshore situation, and Sea Harbor to a harbor situation.
To adjust the preset values, you first have to check that Gain Auto is set correctly - see above, and then:
1. Choose a displayed range of 0.5nm (press key [3]).
2. Set 'Tune' bar to 'AUTO' mode: move cursor to the 'Tune' bar and press [CLR].
3. Set 'Gain' bar to 'AUTO' mode: move cursor to the 'Gain' bar and press [CLR].

4. Set 'Rain' to minimum: move cursor to the 'Rain' bar, and adjust with +/- keys.

Now you are ready to adjust the Sea Auto and Sea Harbor limits in the lower part of the Radar setup display:
First set of 3 digits - minimum: Adjust to lowest figure with acceptable amount of sea clutter on screen.*
Second set of 3 digits - maximum: Adjust to highest figure with acceptable amount of sea clutter on screen.*
Third set of 3 digits - Sensitivity: Adjust to max. acceptable suppression of sea clutter.* 0 = no suppression - Low STC level, and 100 = 100% suppression - High STC level. (If the value is set too high, some targets may be invisible on close range).
*) wait for screen to update to see the result of adjustment.

Note! As the auto mode is always working in the background, any new adjustments may not be immediately visible on the screen. Depending on the weather and personal requirement, these adjustments will need to be aligned more than once.

Scanner status – to activate press one of the +/- keys, which will call up an info window. Press [CLR] to initiate a test of the scanner, which will provide measurement values and other technical details. (For technicians only).

LOW/HIGH rpm are preset to 30/50, but can be adjusted to anywhere within 20-50 rpm (use +/-/numeric keys).

RPM sog limit is preset to 10 kn, meaning that when the rpm is set to AUTO in the control menu, the scanner rotation will stay on LOW at speeds up to 10 knots and then automatically switch to HIGH.

Sector 1 and 2 - one or two blind sectors can be entered by keying in the start bearing and angle of the area you wish to blind off. The blinded sector(s) can cover max. 90°. Toggle between OFF/ON.

10.2 C-MAP cartridges

On the unit's front, below the keypad, are two watertight drawers wherein you place the C-MAP cartridge/C-card you wish to load.

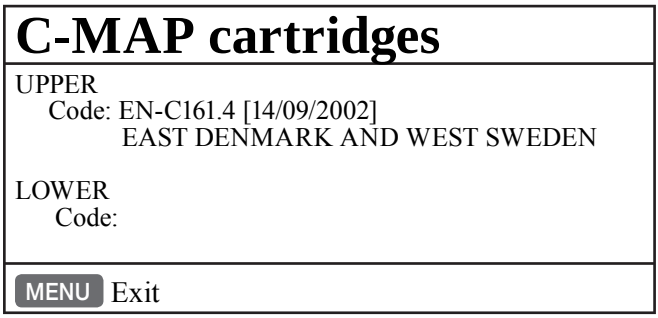
☞ Do not attempt to insert or remove a cartridge unless the unit is turned off, or chart reading is in stand-by - see below.

MENU
8

Call up the menu bar, and...
open the SETUP menu, and...

CHART *load the pop-up window for C-MAP cartridges* (which also brings the chart system in stand-by)

To open the drawer below the keypad, press the eject key next to the drawer. Place the cartridge in the tray with the terminals pointing towards the unit, and push the drawer back in place - make sure it is closed tight, so it remains watertight.



☞ If a C-card is defect, it must be removed before you can exit the display.

MENU *Exit the window*

In addition to the larger boundaries of the world chart there will be separate boundary lines for the individual charts stored on the same cartridge. However, the boundary lines for the C-MAP chart areas can be turned off, so they will not be visible on the chart - refer to section 4.5 Chart setup.

Other chart areas can quickly be reached by means of the zoom keys:

\+ *Zoom out until desired area becomes visible*

Move cursor to approximate area, and...

\- *Zoom in*

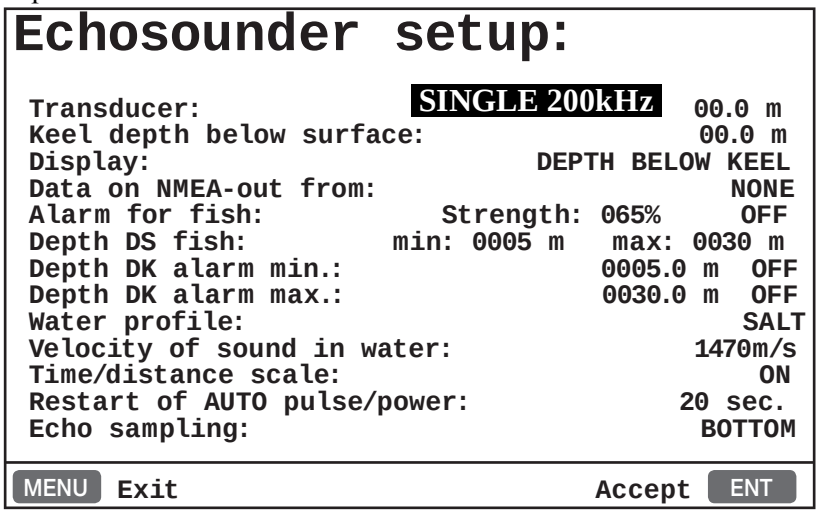
The chart will automatically start to move when cursor reaches the edge of the screen. When cursor is switched off [CLR], the chart will return to ship's position.

10.3 Echosounder setup

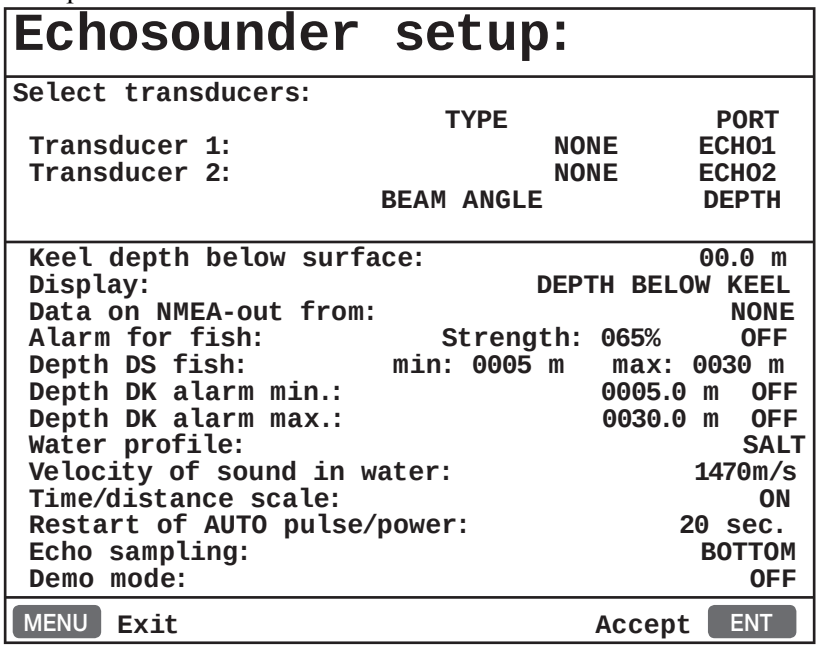
With built-in echosounder function: The Echosounder setup display mainly consist of general settings, but also applies to a specific frequency where stated. The CX34/44/54 features single and dual transceiver transmitting at 38 (CX44/54), 50 and 200 kHz.

MENU *Call up the menu bar, and...*
8 *open the SETUP menu, and...*
ECHO *load Echosounder setup display*

CX34 example:


Echosounder setup:
Transducer: SINGLE 200kHz 00.0 m
Keel depth below surface: 00.0 m
Display: DEPTH BELOW KEEL
Data on NMEA-out from: NONE
Alarm for fish: Strength: 065% OFF
Depth DS fish: min: 0005 m max: 0030 m
Depth DK alarm min.: 0005.0 m OFF
Depth DK alarm max.: 0030.0 m OFF
Water profile: SALT
Velocity of sound in water: 1470m/s
Time/distance scale: ON
Restart of AUTO pulse/power: 20 sec.
Echo sampling: BOTTOM
MENU Exit
Accept ENT

CX44/54 example:


Echosounder setup:
Select transducers:
TYPE PORT
Transducer 1: NONE ECHO1
Transducer 2: NONE ECHO2
BEAM ANGLE DEPTH
Keel depth below surface: 00.0 m
Display: DEPTH BELOW KEEL
Data on NMEA-out from: NONE
Alarm for fish: Strength: 065% OFF
Depth DS fish: min: 0005 m max: 0030 m
Depth DK alarm min.: 0005.0 m OFF
Depth DK alarm max.: 0030.0 m OFF
Water profile: SALT
Velocity of sound in water: 1470m/s
Time/distance scale: ON
Restart of AUTO pulse/power: 20 sec.
Echo sampling: BOTTOM
Demo mode: OFF
MENU Exit
Accept ENT

Use the cursor key to move cursor around in the display

+/- *Select new values by means of the +/- keys*

ENT *Confirm changes, or...*

MENU *Abandon changes and exit display*

Transducer - select transducer type. Insert the depth (position) of the transducer below surface.

Display can show: DEPTH BELOW KEEL / SURFACE / TRANSDUCER

Data on NMEA-out from - select the frequency you wish to use for transfer of data to connected navigator, plotter, etc.

Alarm for fish - set the strength from min. 000 (weak echo) to max. 099% (strong echo), and you can set it ON or OFF.

Depth DS fish - define a specific area below the water surface of minimum and maximum depth for the fish alarm.

Depth DK alarm min. and max. - set up a depth limit alarm for depth below keel.

Water profile - choose between SALT and FRESH water. The setting will reflect on the:

Velocity of sound in water: SALT = 1470 meters per second and FRESH = 1430 meters per second as standard. The standard settings can be even more accurate by slightly increasing the number of meters in warm waters and decreasing in cold waters.

Time/distance scale - will indicate the elapsed time or distance for the echo picture. The readout will appear in the upper part of the echo display. Toggle between time and distance in “Scroll synchronisation”, section 5.7.

Restart of AUTO pulse/power - will automatically restart the echosounder if bottom detection has been lost for the chosen time interval i.e. 10, 20 or 40 seconds. The AUTO pulse and power will restart from 10W and SHORT pulse.

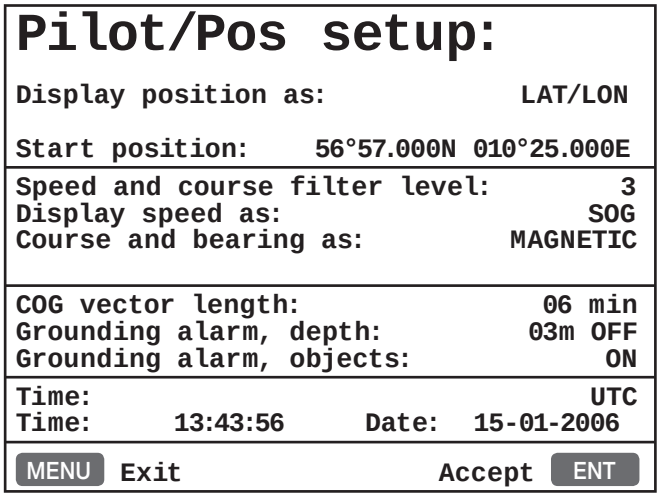
Echo sampling - is preset to BOTTOM, which enables auto range

and a view all the way to the bottom. For vessels moving at high speed with the risc of losing bottom detection, RANGE or a max. depth setting (50 to 2000m) is recommended. The unit will not wait for a bottom echo, but transmit a new pulse as soon as the selected range has been reached. Auto range is automatically switched off. The depth alarm setting will have a higher priority than the selected depth range.

Demo mode - the echosounder will function as though a transducer was connected, but all data presented in the display will be simulated.

10.4 Pilot / Position setup

MENU *Call up the menu bar, and...*
8 *open the SETUP menu, and...*
PILOT *load Pilot/Position setup display*


Pilot/Pos setup:
Display position as: LAT/LON
Start position: 56°57.000N 010°25.000E
Speed and course filter level: 3
Display speed as: SOG
Course and bearing as: MAGNETIC
COG vector length: 06 min
Grounding alarm, depth: 03m OFF
Grounding alarm, objects: ON
Time: UTC
Time: 13:43:56 Date: 15-01-2006
MENU Exit Accept ENT

Go to the function you wish to change

0-9 *Key in new values, or...*
+/- *Toggle between available values*

ENT *Confirm editing*

Display position as - the position can be shown in latitude/longitude, Loran C or decca coordinates (after selecting chain from the

Miscellaneous menu). Toggle with +/-.

Start position - can be inserted if the exact start position is known.

Speed and course filter level - there is a filter of 10 steps available (0= fast response, 9= stable readout).

Display speed as - SOG Speed Over Ground or STW Speed Through Water. Toggle with +/-.

☞ To receive STW information will require connection of external instrument via the SimNet system or the NMEA port.

Course and bearing as - readings of course and bearing can be made in either MAGNETIC or TRUE. Toggle with +/-.

COG vector length - (default to 6 minutes) - indicates own course and speed. The length of the COG vector reflects a distance run during the specified number of minutes at the immediate speed.

Grounding alarm - the function will require a valid position, COG, SOG and a C-MAP C-card inserted in the drawer below the keypad. When an alarm is activated, an info-window will state the cause of the alarm. Reset with [CLR].
Depth alarm - will be activated if the depth at the COG vector end point is less than the value in the Pilot/Position setup and the alarm is set to ON.
Object alarm - will be activted if set to ON and an object is detected beneath the ship i.e. rocks, wrecks, etc.

Time - can be set to UTC or local. Toggle with +/-
Correct actual time and date by means of the numeric keys.

10.5 Speed alarm, units & language

MENU
8,1

Call up the menu bar, and...
load Speed alarm, units & language display
- see display example next page.

The display example sections are for:

CX34/44/54

```
Setup for speed:
 Speed alarm maximum (SOG):000.0kn  OFF
 Speed alarm minimum (SOG):000.0kn  OFF

Setup for units:
 Depth/altitude in:              METERS
 Distance in:            NAUTICAL MILES
 Speed in:                       KNOTS
 Temperature in:         DEGREE CELCIUS
 Pressure in:                       PSI
 Volume in:                      LITER
```

CX34

```
Software version:              CX34 4.00
Serial number:                 0x003d69ab
Interface software version:         1.19
GPS receiver type:                N11999
PAGE rotation interval:          05 sec.
Display text in:               English GB

MENU Exit                      Accept ENT
```

CX44/54

```
Software version:           CX44/54 4.00
TL50 version:             Not connected
AT44 version:      HW rev.: 2, SW: 12.34
GPS receiver type:                N12000
PAGE rotation interval:          05 sec.
Display text in:               English GB

MENU Exit                      Accept ENT
```

Scroll up/down to go to the function you wish to change

0-9 *Key in new values, or...*

+/- *Toggle between available values*

ENT *Confirm changes, or...*

MENU *exit function without making any changes*

Speed alarm - can be set to maximum and/or minimum cruising speed. This may be handy for trawl fishing, entering harbors with speed limits, etc. Speed stability and time of response can be adjusted in Pilot/Position setup, press [MENU], [8], [PILOT], and use the cursor key to go to “Speed and course filter level” to adjust the setting, confirm with [ENT].

☞ Press [CLR] to reset an alarm - this applies to all activated alarms.

Depth / altitude in - can be set to meters (m), feet (ft) or fathoms (fm).

Distance in - can be calculated in nautical miles (nm), kilometers (km) or statue miles (mi).

Speed in - can be shown in knots (kn), kilometers/hour (kh) or miles/hour (mh).

Temperature in - can be shown in Celcius or Fahrenheit.

Pressure in - can be shown in Psi or Pascal (kPa).

Volume in - can be shown in liter or gallon.

Software version - indicates which software version is installed in the unit.

TL50 version (CX44/54) - indicates if a TL50 Turbo Loader is connected and which software version is implemented.

AT44 version (CX44/54) - indicates if an AT44 SimNet converter is connected and which revision hardware and software is implemented.

Serial number (CX34) - indicates the unit's internal serial number.

Interface software version (CX34) - indicates which version is installed in the CX34 unit (for technicians only).

GPS receiver type - indicates which type is installed in the unit (for technicians only).

PAGE rotation interval - can be set to anywhere between 03 to 99 seconds. Refer to "Fundamentals of the display and page system" in section 2.1 for more details on how the function works.

Display text in - as standard the CX34/44/54 is supplied with the following national display languages: Danish (DK), English (GB) and (US*), French (F), German (D), Italian (I), Dutch(NL), Spanish (E), Swedish (S), and Portuguese (P).

*) The difference from GB English to US English is: Celcius is changed to Fahrenheit, meter is changed to feet, and the date presentation is changed from dd.mm.yy to mm.dd.yy.

10.6 Interface setup

CX34 has a connector for SimNet control or NMEA2000 plus one NMEA in/out port.

CX44/54 has two NMEA in/out ports:
1. NMEA1 contains both an NMEA port and connection for the dual station. The NMEA1 data from the main unit is available from NMEA2 port on the dual station i.e. DS44-CX or DS54-CX.
2. NMEA2 is used for connection to SimNet or NMEA2000 via AT44 Active Tee or for standard NMEA interfacing.

Plug-and-play: SimNet offers easy and uncomplicated interfacing with a unique cable and plug solution and automatic system setup. SimNet is the optimum solution for integrating SimNet products and other products with NMEA 2000.

Group selection or stand-alone: Main products, e.g. NavStation, Chartplotter and Autopilot will automatically select the optimum sources for position, heading, depth, speed etc. for all other SimNet products connected. This means that if two Chartplotters are connected, they will both use position data from the same GPS and heading from the same compass. If you wish to use the built-in GPS, also on the Chartplotter, which automatically was set to operate with an external position, you can change the Group selection from SIMRAD to STAND-ALONE.

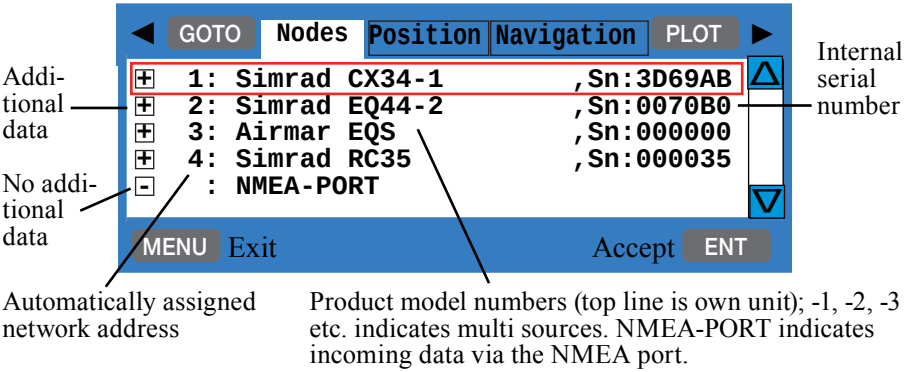
Multi source: If a main product recognizes e.g. two heading devices it will automatically select a gyro compass before a fluxgate compass, and DGPS before GPS.

NMEA 0183 input: If there is no data available from the SimNet bus for e.g. heading, position or depth, the system will automatically look for data via the NMEA 0183 port.

The next pages show examples of interface settings, which are divided into the following groups:
Nodes - Position - Navigation - Water - Compass - Wind - Waypoint - Engine - Alarm - SimNet diagnostic - SimNet input - SimNet output - NMEA0183 input - NMEA0183 output - Identification.

MENU *Call up the menu bar, and...*
8,2 *load interface setup* - see display example next page.

Searching interface channels for valid sources and data. Please wait till the first page appears on the screen which will show the nodes (products) operating on the SimNet bus. See below example:



Move the cursor up/down to select one of the listed products

\+ *Press the* [+] *key to access additional data*

Example:

- **CX34 NAVSTATION**
- **SimNet number=3D69AB, Address: 1**
- **Device: class = 60, function = 170**
- **Instance: system = 0, device = 1**
- **SimNet:Compatible=YES,Ver= 1.000 E**
- **Ver.: NMEA2000 = 1.004, SW = 03.00**
- **Product code=007F,Unique no=138384**

The name **NAVSTATION** can be user defined - see the Identification interface (last tab).

\- *Press the* [-] *key to hide additional data*

General information: Go to the next interface by pressing [PLOT] and step back to the previous interface by pressing [GOTO].
Use the cursor key to move around in the display and toggle between available settings and sentences with the +/- keys.

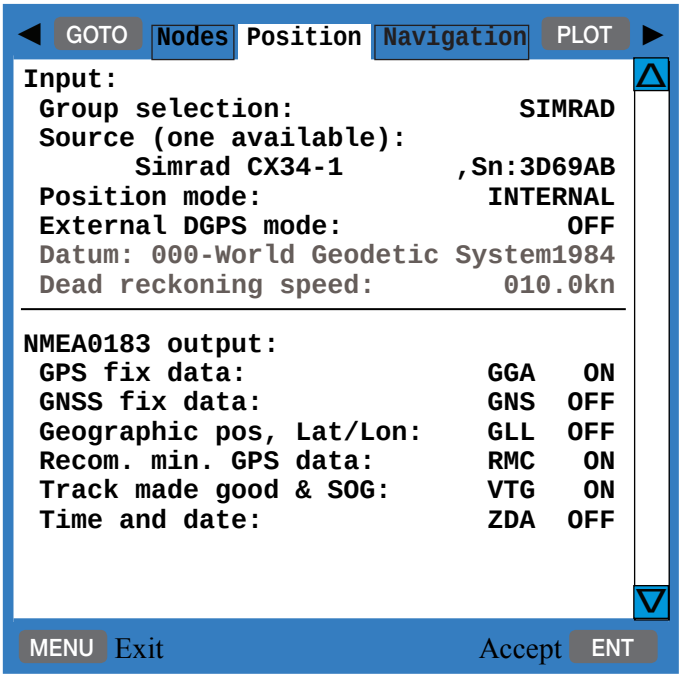
ENT *Confirm editing, or...*

MENU *exit function without making any changes*

Group selection can be set to:
SIMRAD - auto-selected SimNet units from the Simrad group.
STAND-ALONE - manually selected data source and third party units.

Source: - depending on which products (sources) are connected, the legend will indicate: 'none available', 'one available', 'multiple available' or 'owned, data type locked'.

PLOT *Go to Position interface* - step back with [GOTO]



Position mode:

INTERNAL - the applied position is compiled by the in-built GPS receiver.

EXTERNAL - the applied position is compiled by an external unit.

DEAD RECKONING - will allow the system to function as a Navigation simulator, which can be used for demonstration purpose or for practicing 'live' navigation in 'off season'. If you wish to change the preset speed (10 kn), refer to description next page. Navigation to cursor or waypoint, in route or in track is started as described in

chapter 6. The ship symbol will now 'sail' to the point of destination directly or via the route you have selected and you can see how the alarms and automatic waypoint shift all work, as if you were sailing yourself. You can also simulate making a track trailing the ship or plotting eventmarks, etc. as the ship is 'sailing'.

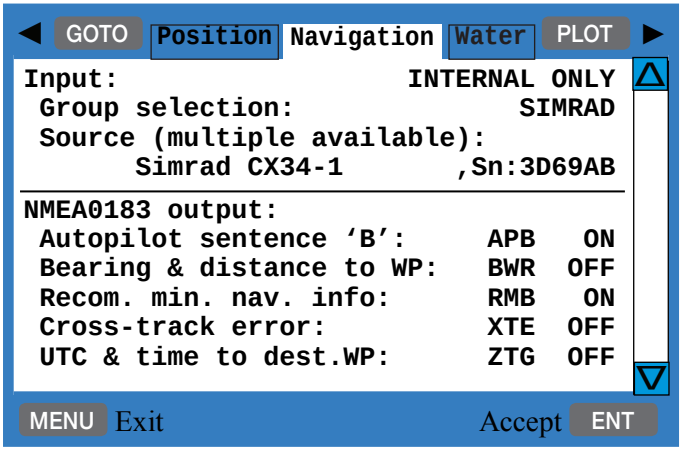
External DGPS mode - set to ON (CX34), NMEA1 or NMEA2 (CX44/54) will enable reception of DGPS data from external receiver. The input port will switch from NMEA0183 to RTCM104 standard, but the output will continue transmitting NMEA0183 data.

Datum:000-World Geodetic System 1984 - the internal datum is applied if the datum line is light grey. If you wish to apply the datum received from external unit and as such need to change the type, the position mode must be EXTERNAL. Enter a new datum by means of the numeric keys or the +/- keys. Refer to list of datums in Appendix B.

Dead reckoning speed - is preset to 010.0 knots, but can be increased or decreased when DEAD RECKONING is selected as position mode. Enter a new speed by means of the numeric keys or the +/- keys.

NMEA0183 output - see also section 10.6.1 Description of sentences.

PLOT *Go to Navigation interface* - step back with [GOTO]

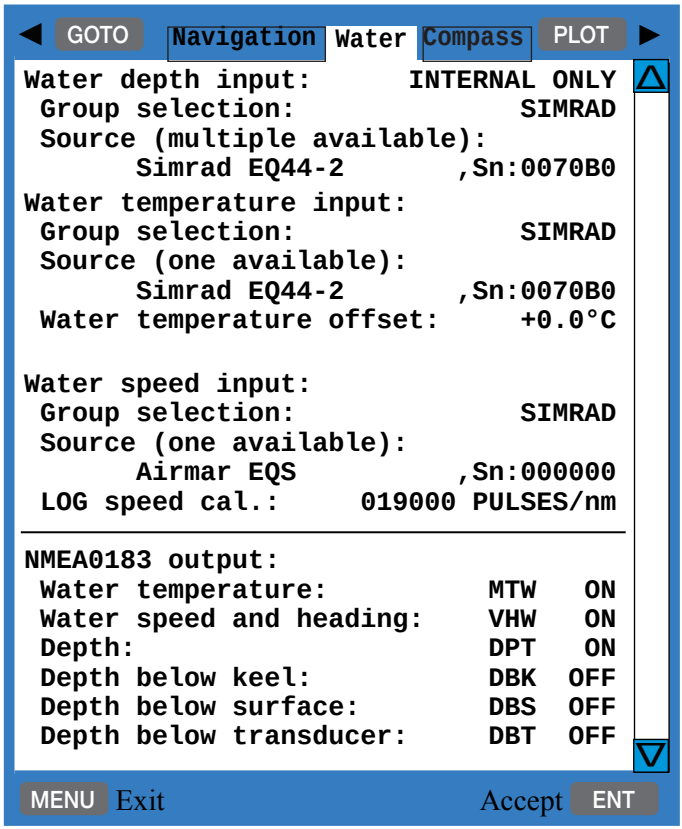


Input: INTERNAL ONLY - indicates that no external source can be selected for navigation.

NMEA0183 output - see also section 10.6.1 Description of sentences.

PLOT *Go to Water interface* - step back with [GOTO]

Example: CX34 with built-in echosounder function:



Example for CX34 without echosounder function, see next page.

Input: INTERNAL ONLY - indicates that no external source can be selected for depth.

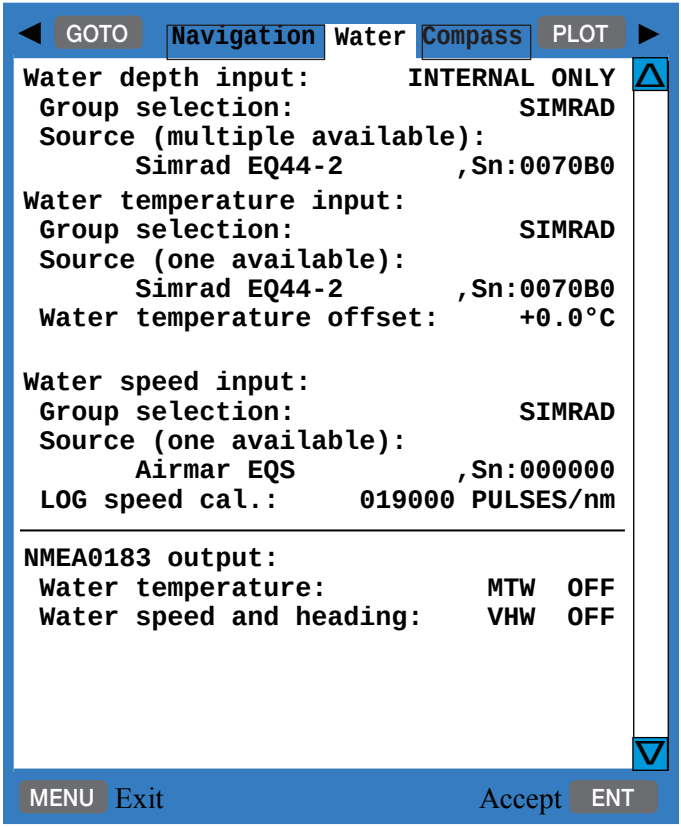
Water temperature offset - a figure can be keyed in to compensate for differencies in temperature sensor.

LOG speed calibration - the unit is preset to receive 19000 pulses per nautical mile from the log transducer (paddle wheel). However the figure might have to be changed to compensate for various transducers and actual water flow passing the transducer. The correct

pulse rate is calculated by:

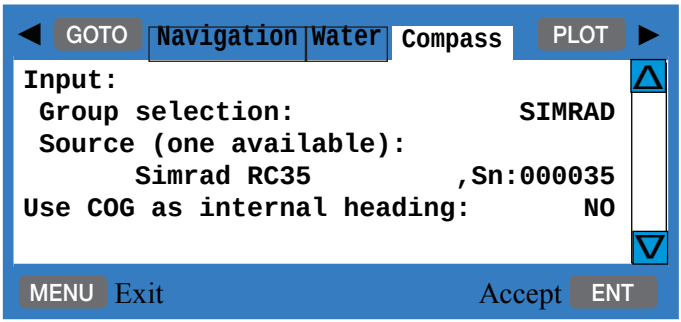
$$\frac{\text{19000 x indicated speed (e.g. 4kn)}}{\text{actual speed (GPS) (e.g. 5kn)}} = 15.200 \text{ pulses/nm}$$

Example: CX34 without echosounder function:



NMEA0183 output - see also section 10.6.1 Description of sentences.

PLOT *Go to Compass interface* - step back with [GOTO]

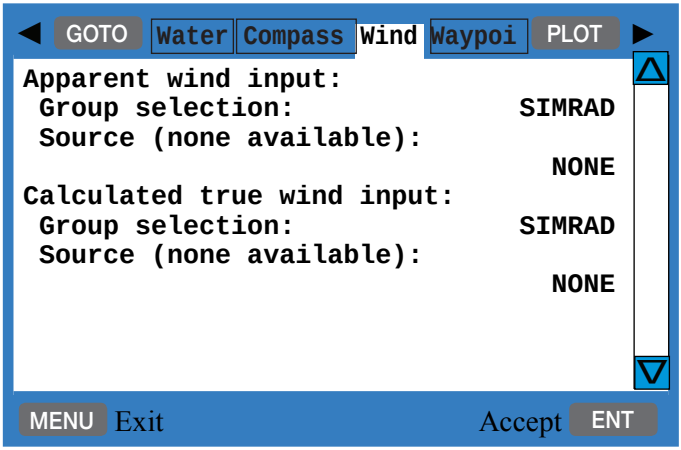


Source - indicates that there is one source available: Simrad RC35.

Use COG as internal heading - if no compass is connected, you can use the course (COG) from the built-in GPS module by changing NO to YES.

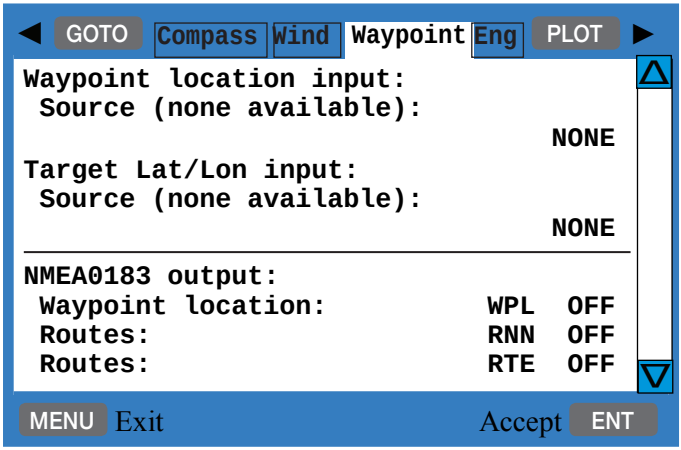
☞ When using the GPS course as replacement for heading input, the accuracy will be reduced in relation to speed, wind and current.

PLOT *Go to Wind interface* - step back with [GOTO]



Source - will indicate how many units are connected and available.

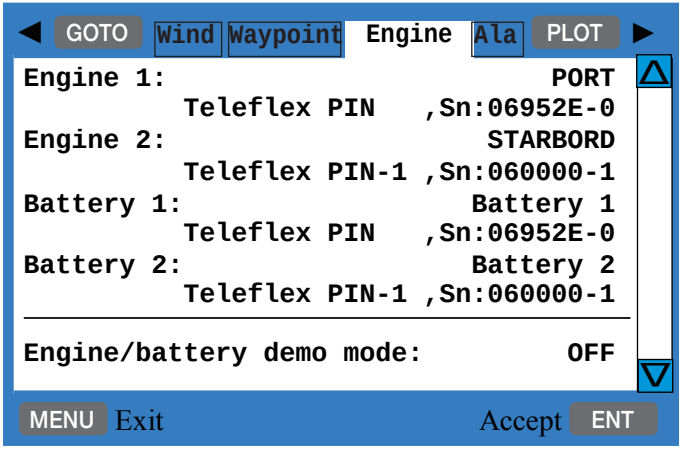
PLOT *Go to Waypoint interface* - step back with [GOTO]



Source - will indicate how many units are connected and available.

NMEA0183 output - see also section 10.6.1 Description of sentences.

PLOT *Go to Engine interface* - step back with [GOTO]

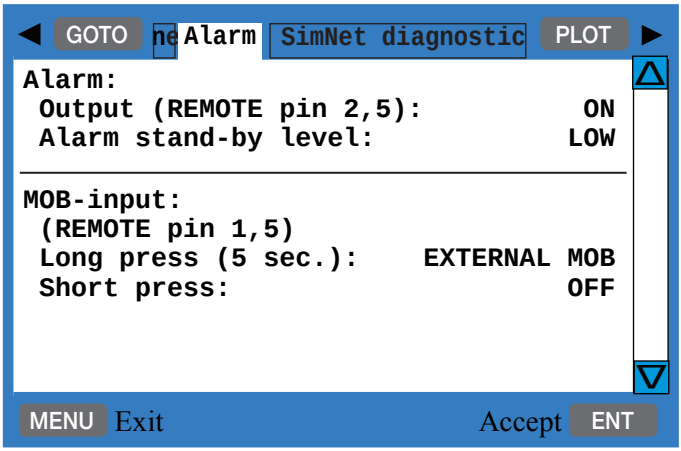


PIN - Propulsion system (Engine interface).

To run a demo of the engine/battery monitoring system, use the cursor to go to OFF and use the +/- key to toggle to ON. When ready to connect the **real** system, be sure to turn off the demo mode again.

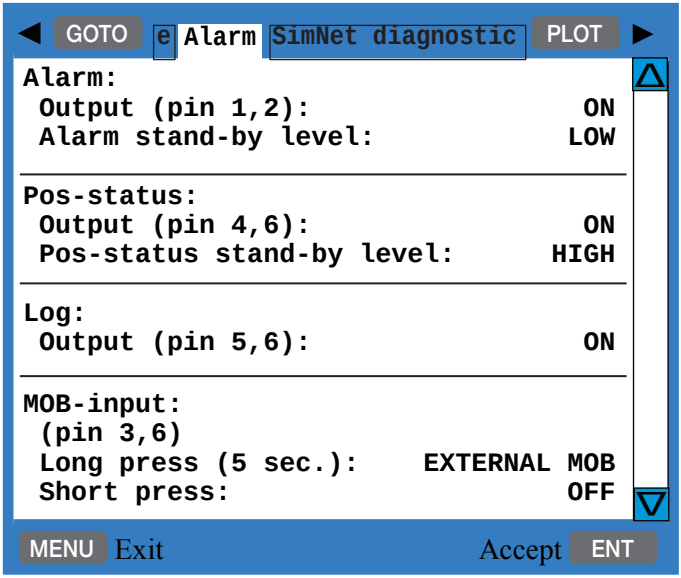
NMEA2000® output - see section 10.6.2 Description of sentences.

PLOT *Go to Alarm interface* - step back with [GOTO]



Example: CX34

Stand-by level can either be: LOW = 0 volt or HIGH = 5 volt.



Example: CX44/54

MOB-input

• Press the external switch for more than 5 seconds to activate the MOB function (fixed setting), and press the [ENT] key to start MOB navigation.

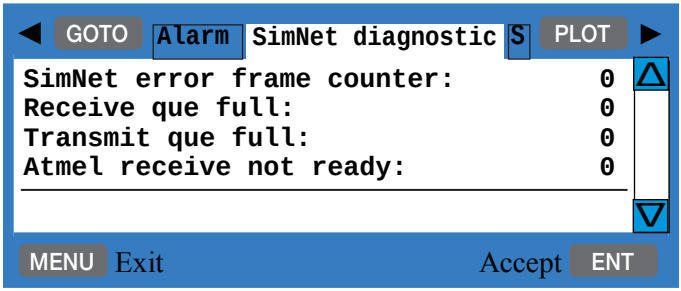
• Short press on the external switch (less than 5 seconds) will shift

page or plot ship's position. Use the +/- keys to toggle between OFF, SHIFT PAGE and PLOT SHIP's POS:

SHIFT PAGE - short press on the external switch will shift to next page stored under the PAGE key.

PLOT SHIP's POS - short press on the external switch will plot and save the actual position, which will be registered in the WP list.

PLOT *Go to SimNet diagnostic interface* - step back with [GOTO]



SimNet error frame counter - if the figure is not 0 it could be due to a number of things and not necessarily that there is a system error. However, if the counter is active and the number is rapidly increasing, then the system has detected a fault.
For instance, if the SimNet cable is pulled, the counter will be activated and once the cable is back in place, the counter will stop, but will stay at the figure it has reached. So therefore, a figure other than 0 does not necessarily mean that something is wrong, only if the figure continues to increase.

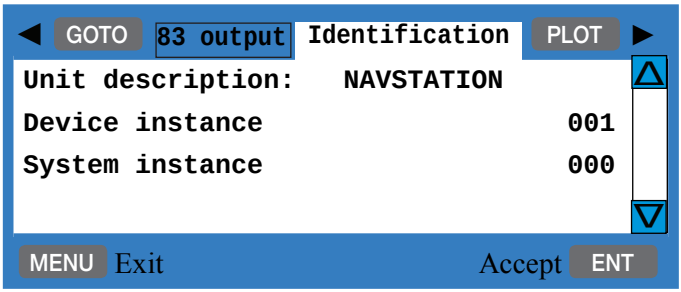
Prior to call for technical assistance:
1. Check connected cabling.
2. Check supply voltage to be between 10.8-15 VDC to the SimNet system.
3. Systematically disconnect one unit at a time to see which one is causing the problem. Start at the opposite end of the 12V power supply.

The three last lines in the SimNet diagnostic interface are for technicians only.

PLOT *Go to the next interface* - step back with [GOTO]

The interfaces: SimNet input, SimNet output, NMEA0183 input and NMEA0183 output are for technicians only.

PLOT *Go to the next and last interface: Identification*
- step back with [GOTO]



Unit description - can be customized to read e.g. MAIN UNIT or BACK-UP UNIT. Maximum number of characters is 16.

The identification name can be seen in the Nodes interface - refer to the beginning of this section.

ENT *Confirm editing, or...*

MENU *exit function without making any changes*

10.6.1 Description of NMEA0183 version 3.0 sentences

Description of output sentences
APB Autopilot sentence 'B'.
BWC Bearing and distance to waypoint (Great circle).
BWR Bearing and distance to waypoint (Rhumbline).
GGA Global Positioning System fix data.
GLL Geographic position, latitude/longitude.
GL2 Geographic position, with 2 decimals.
GNS Satellite Fault Detection
MTW Water temperature
RMB Recommended minimum navigation information.

RMC Recommended minimum specific GPS data.
RNN Routes.
RTE Routes, ONC ON Complete route, or...
ONW ON Working route.
VHW Water speed and heading.
VTG Course over ground and ground speed.
WPL Waypoint location.
XTE Cross-Track-Error, measured.
ZTG UTC & time to destination waypoint.
ZDA Time and date.

Additional sentences for CX34/44/54 with built-in echosounder:
DBK Depth below keel.
DBS Depth below surface.
DBT Depth below transducer.
DPT Depth, including offset.

Description of instrument input
HDG Heading, Deviation and Variation.
HDM Heading, Magnetic.
HDT Heading, True.
MTW Water temperature.
MWV Wind speed and angle.
TLL Target data (will only be updated every 5 seconds).
VHW Water speed and heading.
VWR Relative wind speed and angle.
VWT True wind speed and angle.
WPL Waypoint data (will only be updated every 5 seconds).
RTE Routes

Additional sentences for CX34/44/54 without echosounder:
DBK Depth below keel.
DBS Depth below surface.
DBT Depth below transducer.
DPT Depth, including offset.

Description of external position, heading and speed input
GLL Geographic position, latitude/longitude.
RMA Recommended minimum specific Loran C data.
RMC Recommended minimum specific GPS data.
GGA Global Positioning System fix data.
VTG Track made good (course) and ground speed.

10.6.2 Description of NMEA2000® sentences

PGN name	PGN	Data content	Indication on display
Battery status	127508	Battery instance, Battery potential, Battery current, Battery case temperature	Free name tag related to instance no. Default is: Battery 1, 2, 3, 4 Bat Volt Bat Amp *.*°C or °F
Engine parameters, Rapid update	127488	Engine instance, Engine speed, Engine boost pressure (Turbo)	Free name tag related to instance no. Default is: Engine 1, 2, 3, 4 RPM Turbo Psi or kPa
Engine parameters, Dynamic	127489	Engine instance, Engine oil pressure, Engine coolant temp. Alternator potential Fuel rate Fuel pressure Engine tilt/trim	See above. Oil Psi or kPa Coolnt °C or °F Engine name tag Volt Fuel G/h or L/h and per nm* Fuel Psi or kPa Tilt %
Transmission Parameters, Dynamic	127493	Transmission instance Transmission gear (F,N,R) Transmission oil pressure Transmission oil temp.	Follows name tag and instance of engine. **F**orward, **R**everse or **N**eutral Transm Psi or kPa Transm °C or °F
Fluid Level	127505	Fluid instance Fluid type (Fuel) Fluid level (0-100%)	Follows name tag and instance of engine. Fuel Level %

*) Calculated on the basis of GPS SOG and 'gallons per hour' input.

10.7 Palette setup

☞ Quick change of preset color palettes via the [PWR] key.

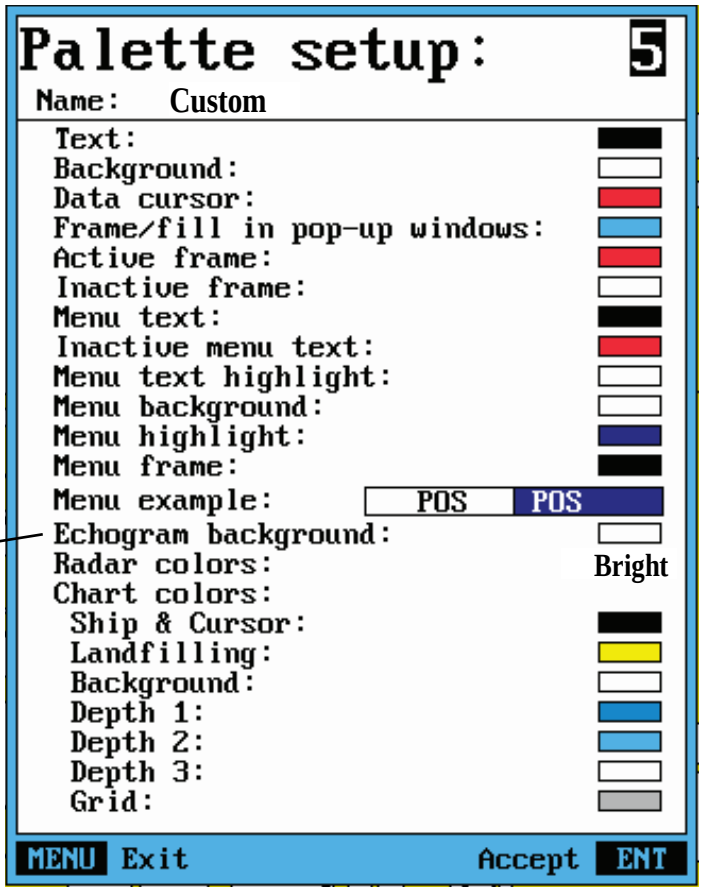
MENU
8,3

Call up the menu bar, and...
load the Palette setup

Palette 1 to 4 are preset to 1:Bright (sunshine), 2:Day (normal daylight), 3:Dusk and 4:Night settings. These four setups are not adjustable. Palette 9:Multi is preset with multi color radar targets. Palette 5 to 8 can be customized to suit individual needs and wishes. If you

wish to make your own special palette setup in e.g. palette 5, then:

5 *Select Palette setup: 5*



only available with built-in echo-sounder function.

Use cursor to scroll up/down in display

A-Z *Key in a name for the new palette setup* - max. 29 characters, -refer to “Naming of routes, points, etc.” in section 2.6.

+/- *Toggle between available color settings*

ENT *Confirm new setup*

10.8 Factory settings

DELETE MEMORY: It will be possible to erase a single category of objects entered into the unit by the user - for example, if moving to a different place in the world you may no longer need the routes etc. you have in the memory. However, an alternative is to store the data on a DataCard or disc - refer to section 9.9.

FACTORY PRESETS: If the unit is still 'alive' but has ceased to respond to normal operation, it could become necessary to return to the factory presets - but first check 'Troubleshooting' in section 11.1.

MENU *Call up the menu bar, and...*
8,4 *activate the display for Factory settings*

	DELETE MEMORY:
1	**Delete all WAYPOINTS**
2	**Delete all ROUTES**
3	**Delete all LINES**
4	**Delete all TRACKS**
5	**Delete all TARGETS**
Used memory:	**0%**
	FACTORY PRESETS:
6	**Return to SimNet/NMEA presets**
7	**Return to CHART presets**
8	**Return to RADAR presets**
9	**Return to SOUNDER presets (with echo-module)**
CLR	**Return to all factory presets**
0	**Show test display**
MENU	**Exit**

To activate any of the functions, please follow the instructions in the display. However, any attempt to make any type of change, will first of all generate a WARNING display to inform you that you are about to erase some or all data/settings.

ENT If you are absolutely sure, *press* [ENT] *to complete the job*

MENU If not absolutely sure, *press* [MENU] *to exit function without having made any changes*

☞ Activating 'Return to all factory presets' will erase all user-made settings including waypoints, routes, tracks etc. and restore the basic settings from the factory. The unit will restart with 'Automatic input source setup' as described in section 2.7 Initial start-up.

☞ Activating 'Return to SimNet/NMEA presets' will give two choices:

Press [1] Product SimNet reset
Reset this unit only

Will bring this unit only back to factory defaults of the Interface setup. The unit will restart with 'Automatic input source setup' as described in section 2.7 Initial start-up.

Press [2] Global SimNet reset
Reset entire Simrad group
on the network

Will bring this unit together with all connected units (which are not turned off at the moment) back to factory defaults of the Interface setup. The units will restart with 'Automatic input source setup' as described in section 2.7 Initial start-up.

Show test display
Information in this display is for technicians only.

POWER OFF - RESET
In case, for some reason, the unit is totally locked i.e. no immediate response from the keypad, then first try to reset the unit by disconnecting the power supply. Reconnect the power cable and then start up the unit again by presssing and holding the [PWR] key until a picture appears on the screen.

MASTER RESET (will return all settings to factory presets)
If the Power off - reset does not solve the problem, you may have to perform a **master reset** by disconnecting the power supply, and then while reconnecting the power cable you will have to press the [PWR] and [CLR] keys at the same time, and hold both keys depressed until a picture appears on the screen. All user-made data will be erased, and all settings are returned to factory presets.

10.9 QuickGuide

A description of the key functions and general guidance* is available in a QuickGuide, which can be accessed either at start-up display - press [PAGE], or via the menu:

MENU *Call up the menu bar, and...*
8,5 *activate the QuickGuide*

PAGE *Leaf through the information/help text in the PAGE system, General, RADAR, CHART, ECHO, PILOT, Owner's setup, and Connectors*

MENU *Exit QuickGuide*

* Some of the information will refer to several models in the CX34/44/54 series.

11.1 Troubleshooting

For all fault finding, first check that the supply voltage is between 10-32 VDC		
Symptom	**Check**	**Remedy**
No picture on display screen	Check that the unit is turned on	Press the [PWR] key on keypad
	Check fuse in power cable fuse holder	Replace fuse. Use only type T6.3A slow (5x20 mm)
Picture appears on the display screen, but image is too dark or too bright		Press [PWR], adjust light and press [ENT]
No normal picture or key operation		Turn unit off and on again
		Disconnect power and connect power again
	Check via [MENU], [8], [CHART] if C-MAP chart is defective	Remove C-MAP chart if defective
		Return to factory presets, see section 10.8
No GPS position update	Check that position mode is INTERNAL, refer to interface setup in [MENU],[8],[2], Position	
	Check antenna and cable	Replace antenna or cable
Screen update is extremely slow	Check that the stored Tracks and Routes (not currently in use) are not all drawn up on the chart	Turn off 'Course line' for each stored route in sec.9.2, and turn off 'Display track' in sec.9.6
Some values are missing in the engine displays.	Check what type of data output is transmitted from the engine(s) via the databus.	The engine source controls the value of the read-outs.
Unstable or no data from SimNet.	Check connection of SimNet cables. Check for stable 12 Volt supply. Check termination is correct.	Use minimum one termination e.g. the power cable with red disc. Perform SimNet system reset, see section 10.8.

Symptom	Check	Remedy
No data from replaced SimNet sensor.	Check connection of SimNet cables.	Perform SimNet system reset, see section 10.8.
All data is deleted after turning off the unit and turning it back on	Check battery lifetime. Expected lifetime is min. 5 years	Internal battery must be replaced by authorized dealer
Radar function:		
Echo image on radar display differs from actual image	Check if ship's heading is incorrect	Set ship's heading correctly - see section 10.1
	Check if timing is incorrect	Set Zero Range correctly - see section 10.1
Echo images on radar display are blurred	Check Gain, Sea and Rain settings	Make adjustments - see section 3.2.5
Too much noise in radar display	Check if tuning is incorrect	Adjust TUNE - see section 3.2.5
Alarm activated in radar function	Check Alarms in section 3.2.10	
Additional data for CX34/44/54 with built-in echosounder function:		
Echo picture appears normal, but no target are shown or only random "noise" is seen	Check that the correct transducer frequency is selected	Change frequency from Echo quick menu, press [ENT], [1] - see section 5.5.
	Check that the transducer connectors are securely mated with the unit	Correctly mate the connectors to the unit
	Check that the receiver gain is set high enough	Increase the receiver gain in 5.7 Presentation setup
	Check that the range is correct for the water depth	Adjust the range in 5.7 Presentation setup
Too much noise in the echo picture	Check that the unit is properly grounded.	Good ground connection between echosounder and connected equipment should always be observed.

11.2 Preventive maintenance

Surface cleaning – to keep the CX34/44/54 cabinet and display screen clean, wipe the surfaces with a clean damp cloth. For heavier cleaning, use a clean, damp cloth which has been dipped in a solution of a mild dish detergent and water. Wring out firmly before wiping the unit.
☞ Never use cleaning solutions containing spirit, alcohol, gasoline or oils.

Electrical connections – periodically check the electrical connections. Make sure that connections are tight and that no cables are frayed or worn.

Transducer for built-in echosounder - periodically clean the face of the transducer with a plastic utensil using a scrubbing action.
☞ Do not use a harsh abrasive or a solvent to clean the transducer.

Radar scanner - periodically check that the scanner's fitting bolts are tight and not corroded. Every 6 to 12 months an even coating of grease should be applied to the entire surface of the scanner drive gear with a spatula or brush. Most of the maintenance of the radar scanner should be left to qualified personnel. If there are problems with the performance, please contact your authorized dealer.
☞ Warning! Do not open the radome before the cable between the radar scanner and CX34/44/54 has been disconnected. It is **not** sufficient just to turn off the power by the switch, as the radar antenna is still supplied power inside.

11.3 Repair and service

The CX34/44/54 is sealed and does not contain any user serviceable parts. Opening of this unit will void its warranty. If the CX34/44/54 requires servicing or repair, call your authorized SIMRAD dealer, but first check Troubleshooting in section 11.1.

Spare parts – fuses may be bought from a chandler or a marine supply store. Use only fuses specified for this unit – see 11.4 Specifications.
If you require a SIMRAD part, please contact your authorized dealer.

11.4 Specifications

General data

Power supply:	12 and 24 V DC (10-32 V DC max) 20-70 watt (+ Radar supply box - see next page)
Power cable:	2 m, 4 pin female connector, (153-5000-007), inclusive: - power fuse T6.3A slow (5x20mm) - fuse for DX radar scanners F8.0A fast (5x20mm)
CSD:	Compass Safe Distance: 650mm (25.6”)
Dimensions:	CX34: H:220 mm (8.7”) L:220 mm (8.7”) D:112 mm (4.5”) CX44: H:220 mm (8.7”) L:365 mm (14.6”) D:75 mm (3”) CX54: H:330 mm (13”) L:460 mm (18.1”) D:95 mm (3.7”)
Weight:	CX34: 3.2 kg (7 lb), CX44: 3.7 kg (8.1 lb), CX54: 6.6 kg (14.5 lb)
Environment:	0 to +50°C (32 to 122°F), waterproof USC 46 CFR and IP55
Housing:	Casted aluminum back, polycarbonate front
Display:	CX34 7”, CX44 10”, CX54 15”: TFT color, power backlight, 640x480 pixel, bonded with anti-reflective coating.
Interfaces:	CX34: 1 port in/out NMEA0183, 1 port SimNet/NMEA2000 CX44/54: 2 ports in/out NMEA0183 (incl.SimNet/NMEA2000 via AT44 Active Tee), PC up/download WPL and RTE
- alarm:	CX34: Signal output 5 Volt 50 mA CX44/54: Alarm relay 24V 0.5 A (contact closure)
- log out:	CX44/54: 200 pulses/nm (5 Volt pulses)
Main fuse:	T6.3A slow (5x20 mm)

SimNet control

Maximum number of products connected in a network:.....50 units
Maximum cable length (excl. 30 m wind transducer cable): .....120 m (400’)
Bit rate of the bus:..... 250 kbit/second
Maximum DC current through a single SimNet plug: 5A
SimNet power supply:..... 10.8 - 15 VDC
Maximum drop cable length:.....6 m (20’)
Maximum total length of all drop cables .....60 m (200’)
Environmental protection: Cable and plug/connector system:.....IP66
Temperature: ..... max. 70°C (158°F)

Radar supply box RS4050 to run radar scanners RB714/5/6A

Addendum:	183-0700-003
Dimensions:	H:125 mm, L:222 mm, D:81 mm
Power supply:	12 and 24 V DC (10-32 V DC max)
Fuses:	Radar supply fuse 4A F
	Main fuse 6A.3F
	High voltage fuse 160 mAF
	Radar motor fuse 6A.3F

Radar supply box RS4052 to run radar scanners RB717/8A

Addendum:	183-0700-004
Dimensions:	H:161.9 mm, L:263 mm, D:91 mm
Power supply:	24 V DC (18-32 V DC max)
Fuses:	Radar supply fuse 10 AT
	Main fuse 6A.3F
	High voltage fuse 200 mAF
	Radar motor fuse 3.16AT

GPS section

Receiver type:	14 channel parallel, C/A code, 8 state Kalman filter	
Accuracy:	Position (DGPS):	2-5 m RMS
	Position (SDGPS):	3-7 m RMS
	Position (GPS):	8 m RMS
	Speed:	0.1 kn
	Course:	1°
Speed filter:	10 settings	
Update rate:	1 second interval, typical	
Dynamics:	Velocity:	600 km/h
	Acceleration:	10 m / s^2

	GPS antenna GPS 5	**DGPS antenna MGL-3**
Type:	Patch	Patch and H-field
Dimensions:	H:100 mm (top=30, bottom=70)	H:75 mm
	Diameter:86 mm	Diameter:127 mm
Weight:	122 g (top=83, bottom=39)	600 g

Environment:	-35°C to +75°C, 95% rel.
Mounting:	1” 14 thread (standard US)
Cable:	10 m RG58 (standard), 15 m RG223 (option), max. 30 m RG213

Chartplotter section

Chart system:	C-MAP MAX or NT+
Presentation:	Dual chart - two charts in individual scales and detail levels
Internal memory:	Dynamic storage with combinations of/or totals up to: 35,000 marks/waypoints 10,000 waypoints with name (25 characters) 50,000 trackpoints 50,000 line sections 1,000 routes

Radar section

Display modes:	Head Up, North Up, True Motion, Dual Range.
Range scale:	0.125 – 48 nm in 11 steps or multi range.
Min. range:	30 meter
Range resolution:	30 meter
Bearing accuracy:	1° or better
Off-center:	Max 66%.
Guard zone:	Can be set at any desired distance and angle in any desired width. IN and OUT modes are available.
Stretch:	AUTO, PULSE, VIDEO.
Trail (wake):	30 sec., 1, 2, 5, 10, 15, 30 min. or permanent.

Radar radome multiVision scanners DX45 and DX60

Approvals:	FCC part 80, FCCID TPADX6000105. EU Declaration of Conformity, 1999/5/EC, EN60945.
Dimensions:	DX45: Ø 465 mm (18.3”), H 261 mm (10.3“) DX60: Ø 615 mm (24.2”), H 261 mm (10.3“)
Weight:	DX45 = 10 kg (22 lb), DX60 = 11.5 kg (25.4 lb)
Range scale:	DX45 = max. 28 nm, DX60 = max. 36 nm.
Input voltage:	12* and 24 V DC (10-32 V DC max) from display unit. *) 24 V DC (14-32 V DC max) for scanner cables longer than 20 m.
Consumption:	60 W (12V 5A) or less (Display and scanner) Standby: 30 W (12V 2.5A) or less.
Environment:	Waterproof to IP66. Temperature range: -25°C to +55°C (13°F to 131°F). Other data according to IEC62252.
Transmitter:	4 kW solid-state modular driving magnetron, 9410 +/- 30 MHz frequency, 0.07-0.7 µs pulse length.

Receiver:	Semi-log, 5.5 dB, 64 MHz (nominal) IF frequency, 14/4 MHz bandwidth.	
Antenna:	Slotted waveguide array, horizontal polarization, rotation rate 20-50 rpm.	
- beam width:	DX45 = 5.6° horizontal, 30° vertical.	
	DX60 = 3.8° horizontal, 30° vertical.	
Housing:	Casted aluminum and ASA.	
Cables:	10m	153.3003.100
	15m	153.3003.150
	20m	153.3003.200
	30m	153.3003.300
	40m	153.3003.400

Radar radome scanners		**RB714A**	**RB715A**
Radome:		450 mm	650 mm
Scanner:		2 kW	4 kW
Range:		to 24 nm	to 36 nm
Rotation speed:		24 rpm	24 or 4 8rpm
Beamwidth:	Horizontal	5.9°	3.9°
	Vertical	25°	25°
Cables:	10m	153.3002.012	153.3002.015
	15m	153.3002.013	153.3002.016
	20m	153.3002.014	153.3002.017
	30m	153.3002.314	153.3002.317
	40m	153.3002.414	153.3002.417

Radar open scanners		**RB716A**	**RB717A**	**RB718A**
Open array:		3 or 4 ft	4 or 6 ft	4 or 6 ft
Scanner:		4 kW	6 kW	12 kW
Range:		to 48 nm	to 72 nm	to 96 nm
Rotation speed:		24 or 48 (24V) rpm	24 or 48 (24V) rpm	24 or 48 (24V) rpm
Beamwidth:	Horizontal	2.5°, 1.8°	1.8°, 1.2°	1.8°, 1.2°
	Vertical	22°	22°	22°
Cables:	10m	153.3002.008	153.3002.008	153.3002.008
	15m	153.3002.009	153.3002.009	153.3002.009
	20m	153.3002.010	153.3002.010	153.3002.010
	30m	153.3002.030	153.3002.030	153.3002.310
	40m	153.3002.040	153.3002.040	153.3002.410

Echosounder section (CX34)

Frequencies: 50 or 200 kHz, selectable
Transmit power: Variable up to 600 watt RMS (4,800 W PP)
Impedance: 175 / 425 ohms
Display ranges: 5 to 1000 m (50kHz) or 5 to 400 m (200kHz), manual and auto mode.

Detection ranges:

Frequency	Beam	Bottom
50 kHz	45°	800 m / 2,400 ft
200 kHz	15°	350 m / 1,050 ft

Pulse length: Short, medium, long and auto
Transmission rate: 10 pings per second
Alarms: Fish, max. and min. depth
Zoom mode: Bottom and VRM expansion, 6 to 50 meter, feet or fathom
Event marker: At current ping and depth memory
Picture speed: True distance or time, high, medium, low, and freeze
Noise filter: User selectable on/off
Echo presentation: A-scope and white line discrimination
Temperature: Sensor or NMEA
Speed: Sensor or NMEA

Echosounder section (CX44/54)

Frequencies: 38, 50 and 200 kHz, selectable
Output power: Variable up to 1kW RMS per channel
Impedance: 75 ohm
Display ranges: 5 to 2000 m (38/50kHz) or 5 to 400 m (200kHz), manual and auto mode.

Max detection ranges:

Frequency	Beam	Fish*	Bottom*
38 kHz	13x21°	410m	1800 m
50 kHz	10x16°	430m	1500 m
200 kHz	7°	280m	400 m

*Single Fish Target Strength: -30dB (60cm cod)
*Bottom Back Scattering Strength: -20dB
*Simrad transducer C38/200 or C50/200

Pulse length: Short, medium, long and auto
Transmission rate: 10 pings per second

Alarms:	Fish, max. and min. depth
Zoom mode:	Shift, bottom and VRM expansion, 3 to 50 meter, feet or fathom
Event marker:	At current ping and depth memory
Picture speed:	True distance or time, high, medium, low, and freeze
Noise filter:	User selectable on/off
Echo pre-sentation:	A-scope and white line discrimination
Temperature:	Sensor or NMEA
Speed:	Sensor or NMEA

50/200kHz medium-range transducers (Airmar Des.A)

B256: 1kW medium range transducer, 16x28° and 4x6° beams.
B45: 600W bronze stem mount transducer, 45° and 15° beam.
B744V: 600W bronze thru hull triducer, depth, speed and temperature, 45° and 15° beam.
P66: 600W plastic transom mount triducer, depth, speed and temperature, 45° and 15° beam.
P319: 600W plastic thru-hull transducer, 45° and 15° beam.

ST850: Speed and temperature only.

Dual frequency transducers (CX44/54)

Simrad C38/200, 1kW high performance combi transducer 38 and 200kHz, 13x21° and 7° beams.
Simrad C50/200, 1kW high performance combi transducer 50 and 200kHz, 10x16° and 7° beams.
Airmar B260-22, 1kW combi transducer 50 and 200kHz, 19° and 6° beams.

Cables included

Power cable, 2 m, 4 pin female connector, (153-5000-007), inclusive:
- power fuse T6.3A slow (5x20mm)
- fuse for DX radar scanners F8.0A fast (5x20mm)

NMEA cable, 1.5 m, 9-pin female connector (153-3002-005)
Antenna cable, 10 m RG58 (153-2025-004)

Accessories included for CX44/54

AT44 Active Tee with connector for SimNet control (153-5555-449)

SimNet cables and accessories (not included)
SimNet cable 0.3 m (1'), (24005829)
SimNet cable 2 m (6.6'), (24005837)
SimNet cable 5 m (16.6'), (24005845)
SimNet cable 10 m (33'), (24005852)
SimNet Tee Joiner, 3 sockets (24005860)
SimNet Multi Joiner, 7 sockets (24006298)
SimNet cable gland (24005878)
SimNet protection plug (24005886)
SimNet termination plug (24005894)
2 m (6.6') SimNet power incl. termination (24005902)
2 m (6.6') SimNet power excl. termination (24005910)
AT10 Universal NMEA0183 converter (24005936)
SimNet cable protection cap (24005928)
SimNet/NMEA2000 drop cable (24005729)

Options for CX34/44/54
Simrad DataCards
C-MAP electronic charts NT+ and MAX
WR20 RemoteCommander
6-channel NMEA Buffer RS5345
PC data cable, 1.5 m (153-3002-024)
Antenna cable 15 m RG223
Universal connection cable for echo transducer, 2 m (153-3004-002)
Scanstrut mounting solutions

DS34-CX Dual Station*, 7" TFT LCD color screen
DS44-CX Dual Station*, 10" TFT/ATFT LCD color screen
DS54-CX Dual Station*, 15" TFT LCD color screen
*) incl. 15 m cable (153-3002-023)
Extension cable for dual station, 10 m (153-6080-004)

Options only for CX34
Alarm/NMEA cable, 2 m (153-6080-001)

Options only for CX44
TiltFrame, 10" (700-5000-042)

Options only for CX44/54
NMEA1 cable, 1.5 m, 9-pin male connector (153-3002-004)
TL50 TurboLoader, external disc drive and NMEA interface
Sunhood, 10" (140-6515) or 15" (140-6752)

General

Almanac – a satellite's almanac data, is data which determines an approximate lane for satellites in orbit. The almanac data is used by the GPS receiver to find and lock onto the satellite signal. CX34/44/54 has a built-in basic almanac.

ATFT – Advanced Thin-Film Transistor (Active matrix) display.

AVN – Approximate Velocity Necessary – to arrive at a specific waypoint at a specific time.

Bearing – is the direction of where to go e.g. towards a specific waypoint.

Course – Course Over Ground, magnetic or true. The direction of which the vessel is moving.

Configuration – the configuration functions of the CX34/44/54 allow you to adapt the system more specifically to your needs. You may set Units of measure (feet, fathoms, meters, etc.), Menu language, Scroll speed, etc.

dGPS – differential data is received from satellites via built-in DGPS module or an external DGPS Receiver.

ETA - Estimated Time of Arrival - at a specific waypoint if keeping a steady speed.

Great circle – the shortest distance between two points on the globe.

Heading – the direction of which the vessel is pointing (from ext.compass).

Measurement units – the user may select the displayed units to be one of the following:

m	meters
ft	feet, 1 foot is 0.3048 meter
fm	fathoms, 1 fathom is 1.83 meters
nm	nautical mile, 1 nm is 1852 meters
kn	knots, nautical mile per hour
km	kilometer, 1 km is 1000 meters
kh	kilometer per hour
mi	statute mile, 1 mile is 1609 meters
mh	mile per hour

MENU – the selection of main menus will be shown in the upper part of the screen. Leaf through the menus by means of the cursor key and the [ENT]

key, or use the numerical keys to activate one of the menus.

Navigation simulator - the chartplotter function features a built-in navigation simulator which can be used for demonstration purpose or for practicing 'live' navigation in 'off season'.
Navigation to cursor or waypoint, in route or in track is started as described in chapter 6. The navigation simulator is started via the interface setup: Press [MENU], [8], [2], [PLOT]; under index tab 'Position' use the cursor to go to 'Position mode' and use the +/- keys to toggle to 'Dead Reckoning'; then go to 'Dead reckoning speed' if you wish to change the current speed by entering a new figure; press [ENT] to confirm.
The ship symbol will now 'sail' to the point of destination directly or via the route you have selected and you can see how the alarms and automatic waypoint shift all work, as if you were sailing yourself. You can also simulate making a track trailing the ship or plotting eventmarks, etc. as the ship is 'sailing'.

NMEA – National Marine Electronics Association. The NMEA is an organization of manufacturers of marine electronics equipment. They have adopted the NMEA0183 as a standard for communications between various types of marine electronic equipment.

Port side – left (red).

Position update - if, for some reason, there is no position update from GPS or external sensor, the displayed position will start to flash and an alarm will be activated to alert the operator. 'Position missing' alarm can be set ON/OFF - see section 8.5. Reset the alarm by [CLR]. The displayed position will stop flashing once normal position update is resumed.

Restart to approaching point – will automatic recalculate the navigation data from current position to approaching point.

Rhumbline – is the straight line to a waypoint on a chart.

SDGPS - Satellite Differential Global Positioning System - will provide position corrections from received satellite signals (WAAS, EGNOS, and MSAS).

Speed – Speed Over Ground, indicated in knots, kilometers, or miles.

Starboard side – right (green).

TFT – Thin-Film Transistor (Active matrix) display.

UTC – Universal Time Coordinates, which is equal to standard time in

London (GMT). UTC is not affected by the local summertime adjustments.

Velocity – speed towards approaching waypoint.

XTE – Cross-Track-Error (-Distance), measured magnitude of the position error perpendicular to the intended track line.

Echosounder section (with built-in echosounder function):

Alarms – can be set to sound a "beep" if the echosounder detects a target above (shallower than) a minimum alarm depth or below (deeper than) a maximum alarm depth. The CX34/44/54 allows you to set the alarm depths and to enable or disable both the minimum and maximum depth alarms.

A-scope – a method of displaying the echosounder information. In A-Scope mode, the echoes are displayed in a "bar-graph" format, with stronger echoes displayed not only in the color representing their target strength, but also in a width representing their target strength.

Depths – DK = Depth below keel, DS = Depth below surface, DT = Depth below transducer.

Echogram background color – is the color shown on the CX34/44/54 in the event no target is present. There are three colors to choose from, white, blue or black, where black is especially useful during nighttime operation when the white background could appear too bright.

Echosounder frequency 38 (CX44/54), 50 or 200 kHz can be selected to suit the task. 200 kHz is for general purpose and offers optimum discrimination and a narrow transmitter beam. 38/50 kHz is for searching in a wider area, determining bottom conditions and going the deepest.

Transducer – the transducer serves as the acoustic "loudspeaker" and "microphone" to send and receive the signals through the water. They are most often made from ceramic elements carefully built into a robust housing. The ceramic elements change shape when a voltage is applied across them (when the CX34/44/54 transmits a signal), and they also generate a voltage when they encounter sound waves (as when the CX34/44/54 is receiving an echo).

Radar section:

Cursor function – The cursor appears on the display as a small ⌖ symbol. To activate the cursor, just press the cursor key. The cursor may now be positioned by using the cursor key. When the cursor is set to a position on the screen, the bearing and distance from ship's position to cursor position will be displayed in the top line of the screen. To turn off the cursor, press CLR.

When heading and valid position data is available, the chart cursor will be synchronized to the radar cursor, and thus be controlled by the radar cursor in the Radar & Chart display.

Off-Center mode - lets you position the origin of own ship to any point on the screen within 66% of the radius of the display (the center 2/3 of the display). The Off-Center mode permits the operator to obtain a longer view in the direction of interest.

Overlay - live radar images shown in a separate layer directly on the chart gives you full control in difficult situations. To activate the overlay will require the following conditions: Valid position, valid heading information, and Radar orientation mode must be in NU (North Up) or CU (Course up). Short press on the [RADAR] key will toggle overlay on/off.
The overlay is disabled in orientation mode HU (Head Up), and can not be activated from the 'Radar & Chart' display.

PLOT function – will require that a heading sensor (Gyro or Compass) is connected to the CX34/44/54. If so, then you can plot the actual cursor position on the radar display by pressing the [PLOT] key from the radar display, and thereby save the position in the WP-list as a waypoint i.e. you can give the plotted waypoint a new name/number, symbol, color, etc.

Relative motion Land, buoys and fixed objects move past own ship.

True motion – land, buoys and fixed objects remain stationary on the screen while moving targets and own ship track across screen.

Select the appropriate datum by inserting the number prefix:
Press [MENU], [4], [2], [ADJ], and key in the desired number by means of the numerical keys or the +/- keys, confirm entry by [ENT].

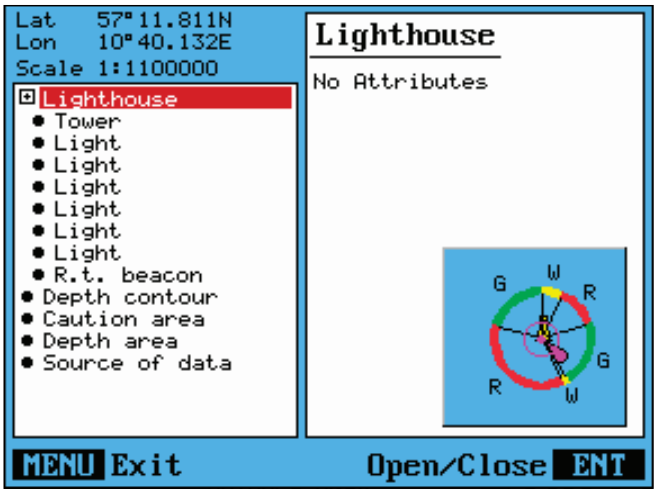
000 World Geodetic System 1984
001 World Geodetic System 1984
002 European 1950
003 European 1979
004 North American 1927
005 North American 1983
006 Geodetic Datum 1983
007 Ordnance Survey of GB 1936
008 South American 1969
009 Adindan
010 Afgooye
011 Ain el Abd 1970
012 Anna 1 Astro 1965
013 Arc 1950
014 Arc 1960
015 Ascension Island 1958
016 Astro Beacon E
017 Astro B4 Sorol Atoll
018 Astro Dos 71/4
019 Astronomic Station 1952
020 Australian Geodetic 1966
021 Australian Geodetic 1984
022 Bellevue (IGN)
023 Bermuda 1957
024 Bogota Observatory
025 Campo Inchauspe
026 Canton Astro 1966
027 Cape
028 Cape Canaveral
029 Carthage
030 Chatham 1971
031 Chua Astro
032 Corrego Allegre
033 Djakarta
034 DOS 1968
035 Easter Island 1967
036 Gandajika Base
037 Guam 1963
038 GUX 1 Astro
039 Hjorsey 1955
040 Hong Kong 1963
041 Indian
042 Ireland 1965
043 ISTS 073 Astro 1969
044 Johnston Island 1961
045 Kandawala
046 Kerguelen Island
047 Kertau 1948
048 L.C. 5 Astro
049 Liberia 1964
050 Luzon
051 Mahe 1971
052 Marco Astro
053 Massawa
054 Merchic
055 Mercury 1960
056 Midway Astro 1961
057 Minna
058 Modified Mercury 1968
059 Nahrwan
060 Nanking 1960
061 Naparima, BW1
062 Observatorio 1966
063 Old Egyptian
064 Old Hawaiian
065 Oman
066 Pico de las Nieves
067 Pitcairn Astro 1967
068 Prov. South Chilean 1963
069 Prov. South American 1956
070 Puerto Rico
071 Qatar National
072 Qornoq
073 Reunion
074 Rome 1940
075 Santo (DOS)
076 Sao Bras
077 Sapper Hill 1943
078 Schwarzeck
079 South Asia
080 Southeast Base

081 Southwest Base
082 Timbalai 1948
083 Tokyo
084 Tristan Astro 1968
085 Viti Levu 1916
086 Wake-Eniwetok 1960
087 Wake Island Astro 1952
088 Zanderij
089 Finnish Datum
090 Swedish Datum
091 World Geodetic System 1984
092 World Geodetic System 1984
093 World Geodetic System 1984
094 World Geodetic System 1984
095 World Geodetic System 1972
096 World Geodetic System 1984
097 World Geodetic System 1984
098 World Geodetic System 1984
099 Lisboa Datum
100 Pulkovo 1942
101 North Am. 1927 Alaska, Can.
102 South American - Yacare
103 Old Hawaiian Maui
104 Old Hawaiian Oahu
105 Old Hawaiian Kauai
106 Bukit Rimpah
107 Camp Area Astro
108 Guam 1963
109 G. Segara
110 Herat North
111 HU-TZU-SHAN
112 Indian (old)
113 Qornoq Datum 1927
114 Scoresbysund Datum 1952
115 Angmassalik Datum 1958
116 Tanarieve Observatory 1925
117 Timbalai
118 Special Indian (MGRS rel.)

The optional detailed C-MAP NT+ or MAX cards can provide numerous of functions which are accessible via symbols presented on the electronic chart. Place the cursor on a C-MAP object e.g. a buoy or light to call up a small data window with details on the object. The data window will stay on screen for about 10 seconds or till cursor is moved. For expanded information, place the cursor on a C-MAP object and press [ENT] to call up an info window:

Scale: 1:20000	Actual chart scale
No user data at cursor position	
1 Edit user data	Inactive function
2 Chart info	See details in this appendix
3 Find nearest port services	See details in this appendix
4 Bearing and dist from A to B	See sec. 4.4.2
5 Lock cursors	See sec. 4.4.2
8 Tidal current predictions	See details in this appendix
0 Cursor to center	See sec. 4.4.2
PAGE More user data	Inactive function
MENU Exit	Exit info window

2 *Chart info* will provide information on the C-MAP objects e.g. Lighthouse, Depth area, Fishery zone, Navigation mark, Buoy, Fog signal, etc.



ENT Press [ENT] to Open/Close for additional information available for the object next to ☒ symbols.

Use the cursor to move up/down in the list of objects in the left column
- details on the object will appear in the right column. In case the details overflows the window, use the +/- keys to move up/down in the text lines. Press [MENU] to exit the function.

Service information

With cursor placed on the chart, the service information will be provided in relation to the cursor position. With the chart cursor turned off (press [CLR], the service information will be provided in relation to the ship's position:

ENT *Press* [ENT] *from the chart display to call up the Info window*

3 *Find nearest port services* will call up a list of symbols with relevant information on each symbol. The details in the right column will indicate the distance from the ship to the selected service. The services with the shortest distance are listed first.

Use the cursor to go to the object in the left column you wish to have information on
- e.g. the "Port / Marina" symbol and then use the +/- keys to highlight the location you wish to locate on the chart by pressing [ENT].

The chart will now zoom in on the Port / Marina location you selected from the list.

ENT With the cursor on the Port/Marina symbol, *press* [ENT], and
2 [2] *to call up a list of attributes on the location*

ENT Press [ENT] to Open/Close for additional information available for the port/marina next to ☒ symbols.

Use the cursor key to scroll up/down in the list of facilities in the left colum, and look in the right column for details
- in case some of the details are blocked or overflows the window, use the +/- keys to move up/down in the text lines.

MENU *Exit Chart info*

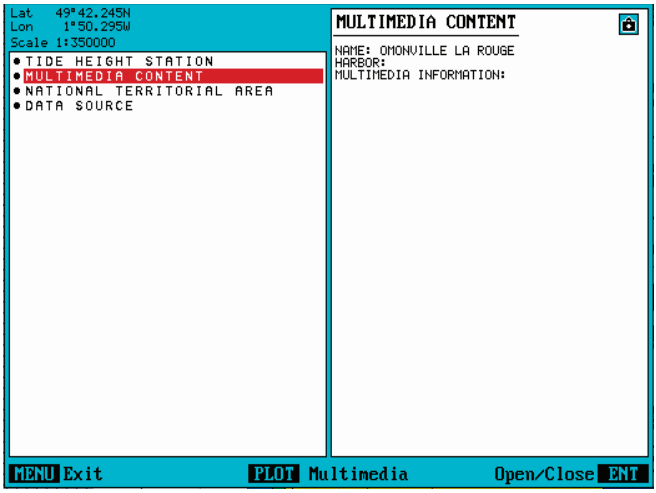
☞ Use the same procedure to locate a Hospital, Coast Guard, Fuel Station, Public Telephone, Provisions, etc.

Pictures and diagrams

The enhanced MAX cartography can show aerial images, landmarks, Nav-Aids, etc and e.g. bridge diagrams. The C-card has a collection of pictures and diagrams from key market areas. To recognice when there is a picture or diagram available on the location, see example below:

Press the cursor key to activate the chart cursor, and place the cursor on e.g. a Port/Marina symbol
- a pop-up window will show the name of the location and list some of the facilities. The information will stay on the screen for approx. 10 seconds. Before it disappears:

ENT *Press* [ENT] *to call up the info-window on the location*



Use the cursor to highlight MULTIMEDIA CONTENT
- details on the facilities will appear in the right column together with an image of a camera in the top right corner.

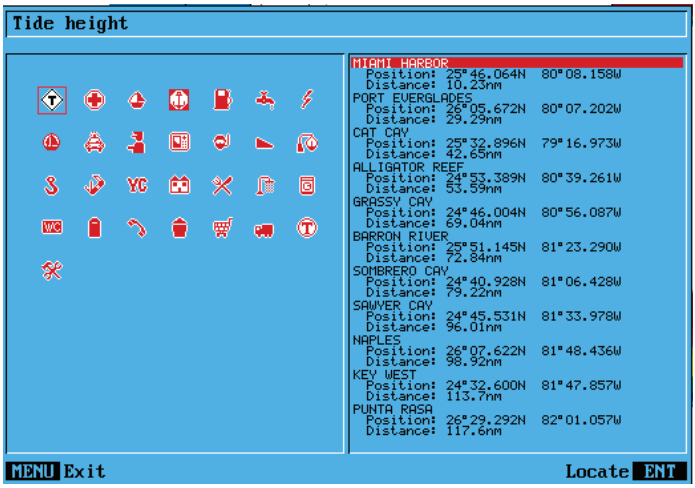
PLOT *Press* [PLOT] *to open the picture/diagram*

MENU *Press* [MENU] *to remove it from the screen again*

Tide information

ENT *Press* [ENT] *from the chart display to call up the Info window*

3 *Press* [3] *to call up the C-MAP symbols with available facilities*



+/- *Use the +/- keys to select the location where you want to know the tide height*

ENT *Press* [ENT] *to go to the tide symbol on the location*

ENT With the cursor placed on the tide symbol, *press* [ENT] *to call up the INFO window*

2 *Press* [2] *to access chart info*
- see display example next page.

If you wish to see the low and high tides for a different date - in the past or in the future - it is possible to change the date:

Day In the display there will be a red box cursor on the number of the day in the month. Toggle to a different number (date) with the +/- keys.

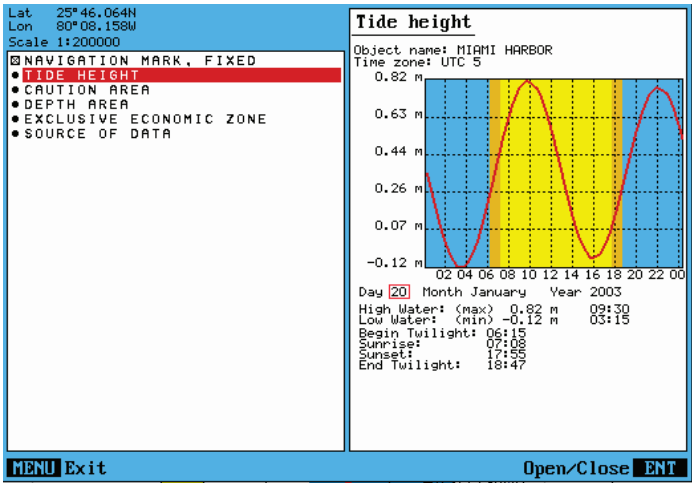
Month Use the cursor (right side) to go to the present month. Toggle to a different month with the +/- keys.

Year Use the cursor (right side) to go to the year. Toggle to a different year with the +/- keys.

The last four lines in the tide display will inform of **Begin** and **End Twilight**, **Sunrise** and **Sunset** for the selected date.

MENU *Press* [MENU] *when you are ready to exit Tide height*

Example of Tide height information:



Caution - the tide information system is quite accurate. However, the predictions are subject to variables, which, like the weather, are beyond the control of man. The tide predictions are based on normal weather conditions. Hurricanes and strong winds will often have a strong influence on the water level, which can vary several meters. Changes in a coast line, either due to natural erosion, major storms or larger man-made constructions, like breakwaters or dredged canals, can also have influence on the local tide situation.

Tidal current prediction

Press the cursor key to activate the chart cursor and then place the cursor in the area on the chart where you wish to obtain information on the current at a given date

If the area is far from your actual position, you can easily 'travel' anywhere you wish by following the procedure described on page C-2 for information on Port/Marina.

ENT *Press* [ENT] *to call up the Info window*

8 *Press* [8] *to call up the Tidal current prediction display*

The red frame around the chart indicates the active field in the display, so at this point the visible chart area can be altered by:

+/- *Zoom out with* [+], *zoom in with* [-] (more details)

Use the cursor to move the chart in steps

The arrows on the chart will indicate direction and strength of the current by means of color and size:

0 to 0.1 kn - Green
0.2 to 1.0 kn - Green
1.1 to 2.0 kn - Yellow
2.1 to 3.0 kn - Yellow
3.1 to 9.9 kn - Red

☞ If no arrows appear on the chart, press the [-] key to zoom in for details. If there is still no arrows, then there are no current prediction available in the selected area.

To check for current predictions at a different date or time, in the past or in the future:

WIN *Press* [WIN] *to move the red frame in the display*

+/- *Increase / decrease the value*
- and wait for the chart to update the information.

MENU *Exit with* [MENU]

Objects organized in categories

The purpose of the C-MAP functions is to select objects, which are to be displayed on the screen (chart). The objects are organized in categories and each category can be selected as one, without having to decide upon almost 300 objects separately. Refer to section 4.5 Chart setup.
The following functions are used to enable/disable visualization of the categories listed below:

LAND SETTINGS		
Natural features: Land area and coastline Hill, dune area Land contour lines Salt pan Slope topline Tree point Vegetation area Natural features rivers: Lake, Waterfall River, Canal	Cultural features: Airport area Built-up area Railway Road in general Overhead cable, w/pylons Overhead pipeline Fence line Telepheric Bridge Tunnel, tunnel entrance Points of interest: Attractions, Historic buildings, etc.	Landmarks: Building, religious / single Cemetery Fortifid structure Siloway route part Tank, chimney Dish aerial Radar dome Flagstaff / Flagpole Flare stack Mast, Tower, Monument Windmill, windmotor Traffic: Roads, railroads, etc.

MARINE SETTINGS		
Names: Text Nav-Aids/Lights/Light Sectors: Lighthouse, Light float Lighted offshore platform Light in general Signals: Anchor point, Cairn Chain / Wire, Fog signal Radar reflector, Top mark Navigational aid, generic Extended nav.aid, generic Radar station Radar transponder beacon Radio station	Buoys: Cardinal Installation Isolated danger Lateral Safe water Special purpose Generic Attention Areas: - see Caution Areas Tides, currents: Tide height (predictions) Current Water turbulence	Nature of seabed: Seabed area, rocky area, coral reef Weed / kelp Sand waves Spring in seabed

Ports:	Restaurant	Tracks, routes:
Berthing facility-up area	Bank/Exchange office	Deep water route part
Causeway	Pharmacy	Deep water route centrel.
Checkpoint	Port/Marina	Fairway
Crane	Boat hoist	Ferry route
Dam	Fuel station	Navigation line
Distance mark	Water	Precautionary area
Dock area	Electricity	Radar line
Dry dock	Showers	Radar range
Dyke area	Laundrette	Radio calling
Dyke crown	Public toilets	Recomm. route centreline
Floating dock	Post box	Recommended track
Gate	Public telephone	Recomm. traffic lane part
Harbor facility	Refuse bin	Traffic separation line
Landing place	Visitor's berth	Traffic sep. boundary
Lock basin	Chaneler	Traffic sep. crossing
Oil barrier	Provisions	Traffic sep. land part
Ramp area	Bottle gas	Traffic sep. roundabout
Shoreline construction	Car parking	Traffic separation zone
Slipway	Parking for boat+trailer	Two-way route part
Weir line	Caravan site	
Small craft facility	Camping site	
Coastguard station	Sewerage pump station	
Pilot boarding place	Public telegraph	
Rescue station	Public radio	
Signal station, warning	Public radiotelegraph	
Port area		
Harbor master		
Coast guard		
Police		
Customs		
Health emergency		
Post office		
Yacht club		
Boat yard		
Marine electronics		
Electric/electronic repairs		
Engine repairs		
Sailmaker		
Fishing/diving gear		
Scuba recharge		
Hotel/Inn		

Attention Areas/ Caution Areas: Fishing facility Marine farm/culture Cable, submarine Cable area Offshore production area Pipeline area Anchor berth Anchorage area Cargo transhipment area	Contiguous zone Continental shelf area Custom zone Dumping ground Exclusive economic zone Fishery zone Fishing ground Free port area Harbor area (administr.) Incineration area Log pond	Military practice area National territorial area Restricted area Sea-plane landing area Spoil ground Straight territorial sea baseline Submarine transit lane Territorial sea area

DEPTH SETTINGS

Soundings: Spot sounding Underwater objects: Rocks Wreck area Obstruction Submarine cable Submarine pipeline Cable area, submarine pipeline area	Depths: Depth contour Shallow water blue Zero meter contour

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SIMRAD
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EU Declaration of Conformity

CE R&TTE

I, the undersigned, hereby declare that the following equipment complies with the relevant essential requirements in the Directive 1999/5/EC of the European Parliament and the Council of 9 March 1999 on radio equipment and telecommunication terminal equipment and the mutual recognition of their conformity.

Conformity assessment	Annex II of 1999/5/EC (internal production control)
Employed standards	Article 3(1)(a) EN60945.2002 Article 3(1)(b) EN60945.2002
Equipment category	Navigational equipment intended for world-wide use aboard non-SOLAS vessels
Model(s)	Simrad CX34, CX44 and CX54 SDGPS NavStation
Remarks	Interfaces to the following Simrad branded radar scanners: DX45, DX60 and RB714A, RB715A, RB716A, RB717A, RB718A
Manufacturer	Simrad Støvring AS Østre Allé 6, DK-9530 Støvring Denmark Telephone +45 98373499 Telefax +45 98373807

Signed ……..…… 14 April 2005
Odin Sletten, Customer Support Manager

SIMRAD warrants that every product shall be free of defects in material and workmanship as specified below:

CATEGORY "A":
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These products are warranted for a period of 24 months on parts and 12 months on labor from date of purchase, except for category B items. Consumable parts such as lamps, fuses, batteries, bearings, etc. are not covered by this warranty.

CATEGORY "B":
•Antennas •Transducers •Trawl sensors •Monitors (CRT/LCD) •Radar magnetrons •Disk drives.
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